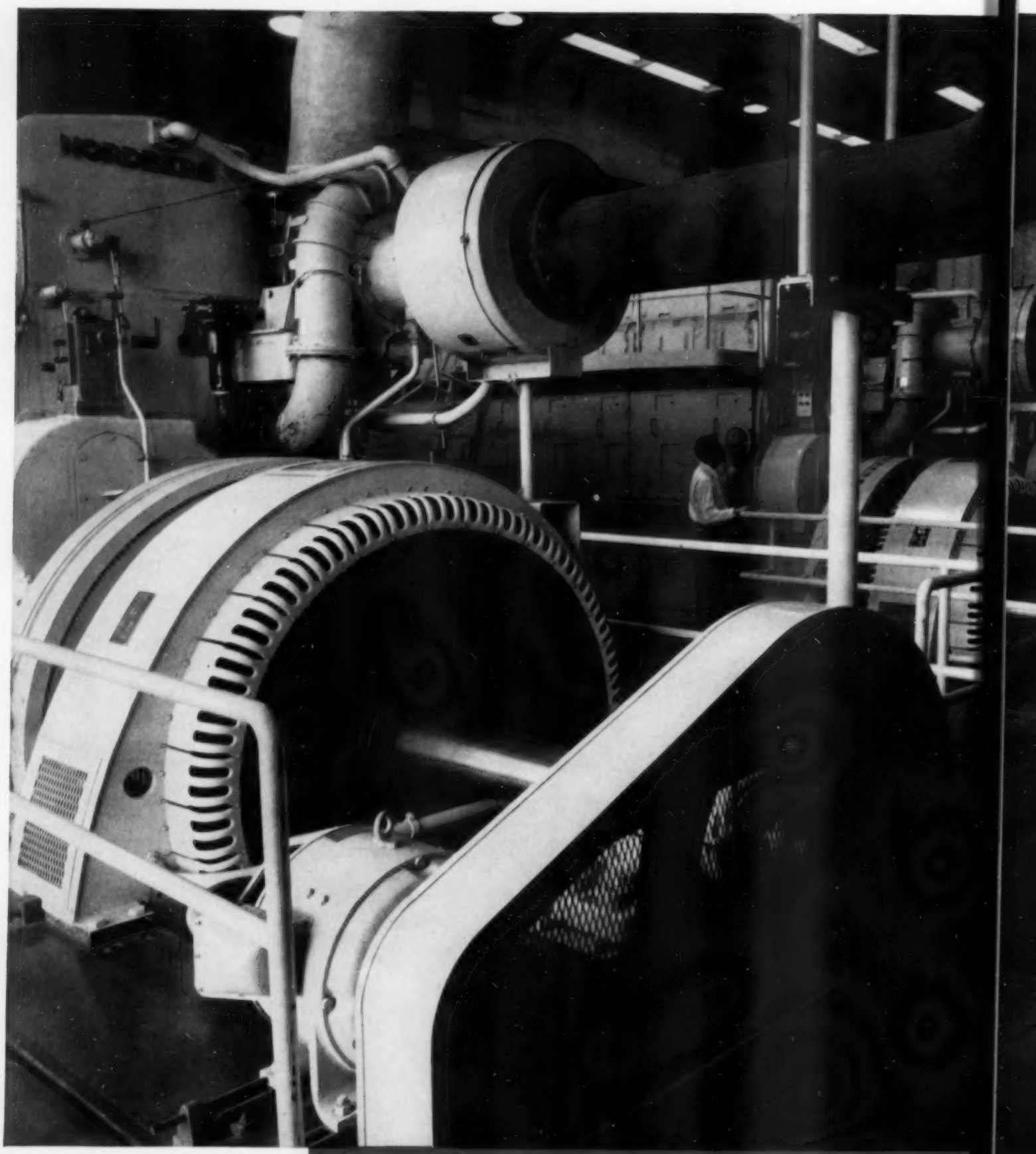
DIESEL PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

FIVE DOLLARS PER YEAR

JUNE, 1956

FIFTY CENTS PER COPY



TUNE IN:
TEXACO STAR THEATER
starring
JIMMY DURANTE
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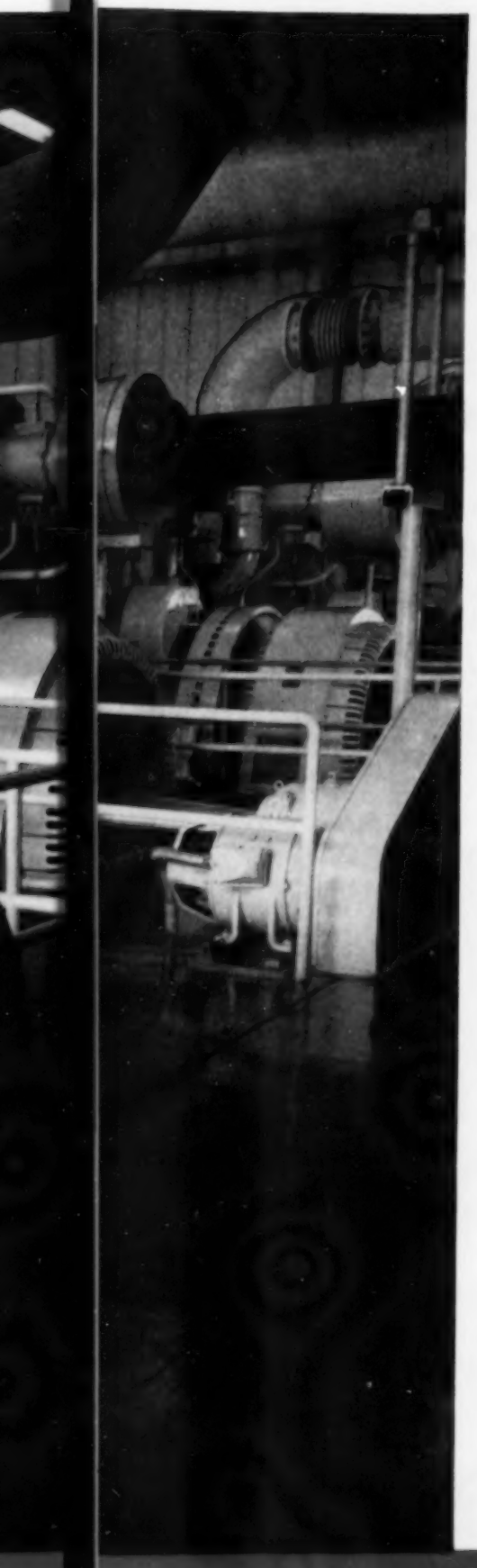


"Overhauls unfailingly show engines clean..."

In this highly efficient diesel plant (name on request) strict maintenance procedures are followed. The four dual-fuel engines shown are lubricated with *Texaco Ursa Oil Heavy Duty* and the Chief Engineer reports:

> **"Overhauls unfailingly show engines clean—no deposits and all rings free. Wear is virtually unmeasurable . . . with low maintenance costs and minimum fuel consumption."**

Texaco Ursa Oil Heavy Duty is one of the complete line of famous *Texaco Ursa Oils* especially refined and processed to made diesel, gas and dual-fuel engines deliver *more power* with *less fuel* over *longer periods* between overhauls. And because these benefits are so consistently delivered, it is a fact that—

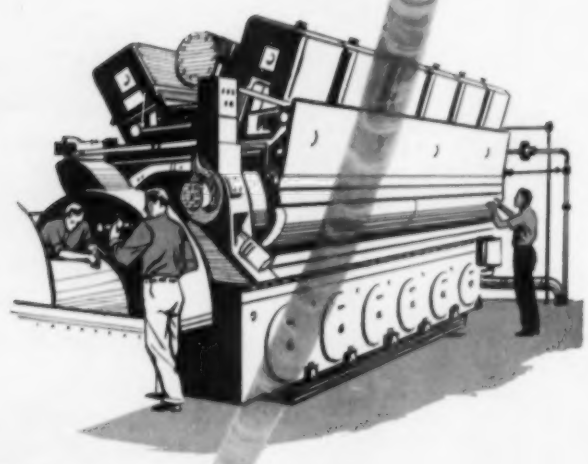
> **For over 20 years, more stationary diesel h.p. in the U. S. has been lubricated with Texaco than with any other brand.**

A Texaco Lubrication Engineer will gladly help you get maximum efficiency from your diesel operation. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

MORE DRIVE

for your diesel!



Here is how the application of AiResearch Turbochargers can affect the performance of your mobile or stationary diesel equipment:

✶ Adds more power in relation to size and weight than any other units in this field.

✶ Decreases fuel consumption. Besides decreasing costs, this factor greatly increases the non-refueling range for mobile equipment.

✶ Provides power as needed by responding rapidly to acceleration requirements. This factor greatly decreases smoking.

✶ Maintains sea-level power under all altitude conditions.

✶ Greatly reduces the noise level of your equipment while eliminating power-wasting mufflers.

AiResearch is the largest producer of small turbomachinery in the United States. Twenty-five *million* hours of experience in deriving exceptional power from small units is the background for the development of the AiResearch Turbocharger. This power package was recently applied to earth-moving diesel equipment with startlingly effective results.

Your inquiries are invited.

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND RELATED MACHINERY

DIESEL and GAS ENGINE PROGRESS

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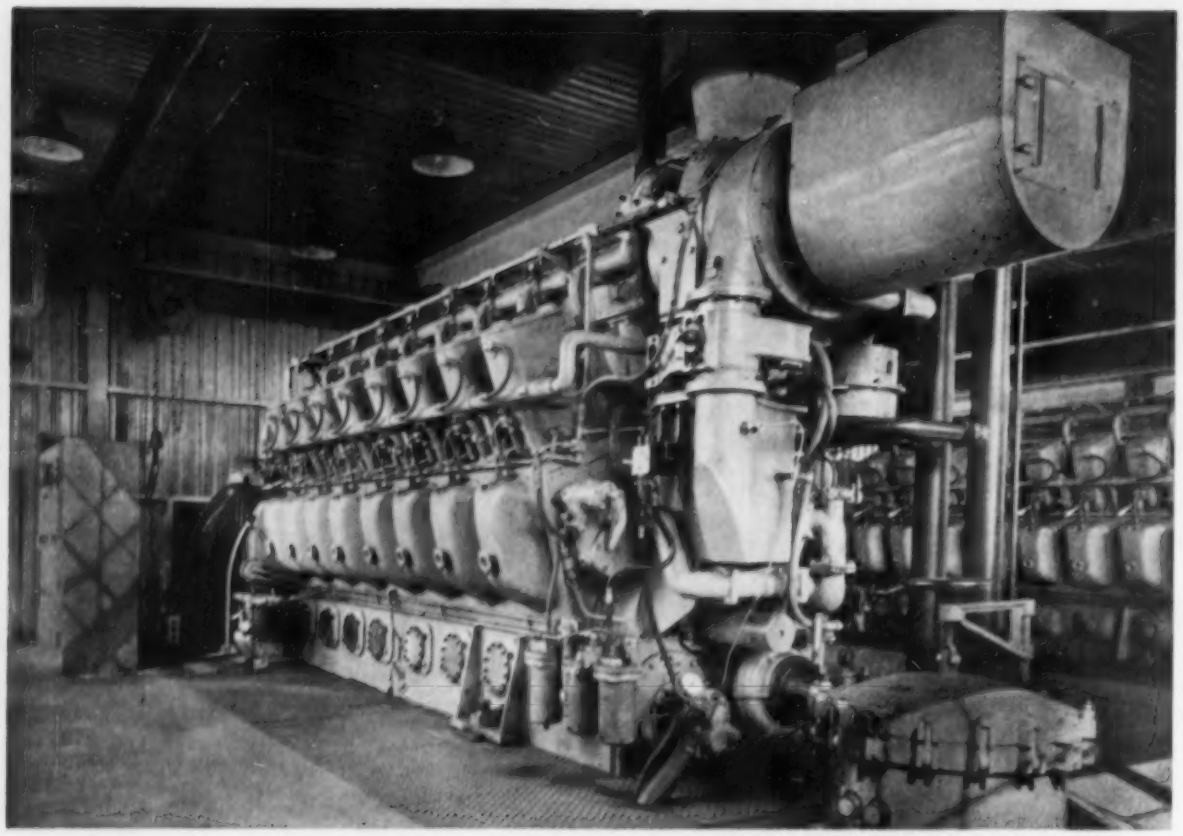
FRONT COVER ILLUSTRATION

The diesel-electric tug *Cavalier*, powered with two Alco 900 hp engines, handling the super-carrier *USS Forrestal*. This powerful tug, owned by Curtis Bay Towing Co., sees plenty of service in and around her home port of Norfolk, Va.



One of two ALCO *251 Vee 16 diesels recently installed for pumping at the Laton Station of the Service Pipe Line Company.*

ALCO 251 DIESEL SETS MODERN STANDARDS IN WEIGHT, POWER, ECONOMY

The ALCO 251 diesel brings modern standards of light weight, high power, high efficiency and increased economy to all stationary and marine applications. Ranging in horsepower from 550 to 2400, the 3 modern turbo-supercharged 251 diesels — in-line six, Vee 12, and Vee 16 – all have interchangeable working parts. With a wide selection of standard modifications available, the engines are ideally suited to applications where the following advantages are desired:

Low Initial Cost — Standardized design, produced on assembly-line basis.

Low Installation Cost — Lower weight per horsepower, compact design, four-point mounting, and adaptability to "packaged" power applications.

Low Operating Cost—Strong, rugged weldments, modern metallurgy, adaptability to remote or automatic operation, and readily available, low-cost replacement parts.

Complete Service Facilities — Seven regional warehouses, three repair and rebuild centers, experienced field-service engineering.

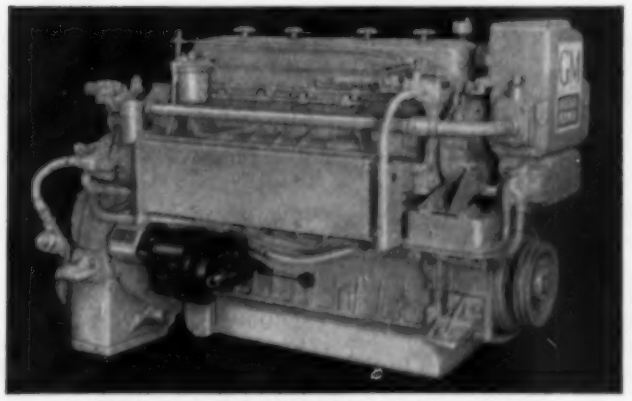
Contact your nearest ALCO sales office or write P. O. Box 1065, Schenectady 1, New York for information.

ALCO

ALCO PRODUCTS, INC.
NEW YORK
Sales Offices in Principal Cities

Bendix* AE

HAND-CRANKED INERTIA STARTER



Performance proved on thousands of diesel- and ignition-fired marine and industrial engine installations.

COSTS LESS TO INSTALL

HERE'S WHY:

- **Requires NO CABLES, NO PUMPS, NO PLUMBING**
- **More easily mounted and in more positions**
- **Can be installed in ten minutes without the use of any special tools**
- **Completely self contained . . . no "extras" to buy**

To low installation cost, add rugged, simple design and dependable operation. Then you have the explanation of why the Bendix AE hand-cranked inertia starter is in such big demand by men in the oil, marine, construction, agriculture and mining fields. Particularly in remote areas and under difficult operating and climatic conditions, this starter fills a very real need. For full details write BENDIX INTERNATIONAL, DIVISION OF BENDIX AVIATION CORPORATION, 205 East 42nd Street, New York 17, N.Y. Cable: "Bendixint", N.Y.

*REG. U.S. PAT. OFFICE.

Bendix International Product

Bendix AVIATION CORPORATION

"This piston tells the story of better lubrication with GULF DIESELMOTIVE,"

says Mr. Oscar Voight, Chief Engineer of Baker-Whitely Towing Co., Baltimore, Md.

"I'VE never seen anything like Gulf Dieselmotive oil for tugboat engine lubrication," says Mr. Voight. "When we pulled the pistons of the 'Columbia' after nine years of continuous service, they were barely worn. Rings were free and ports not clogged. Those pistons still had plenty of service left in them."

Gulf Dieselmotive oil has proved time and again in scores of tug fleets that it has the quality to stand up and provide more effective protection for the powerful engines of these hard working boats.

Here's why:

1 Chosen for their ability to prevent hard carbon deposits in hot spots, the selected base stocks of Dieselmotive oil also provide an oxidation resistance safety factor.

2 100% solvent refining of base stocks (which removes undesirable constituents) guarantees greater stability and more effective bearing protection.

3 Superior additive response is obtained by carefully matching the additives to the base stocks. This insures clean rings, grooves, oil cooling passages, and a minimum of piston crown deposits.

This combination of Dieselmotive qualities makes possible more hours of operation between ring jobs, and lower maintenance costs. Ask a Gulf Sales Engineer—experienced in Diesel engine operation—to recommend the proper grade of this outstanding lubricating oil for your Diesels. Contact him at your nearest Gulf office or write to Gulf Oil Corporation · Gulf Refining Company, 1822 Gulf Building, Pittsburgh 30, Pa.

X-1348

GULF

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

hold down temperatures and operating costs

of this Baldwin-Lima-Hamilton Diesel

Lower initial cost and comparable operating cost led to the selection of this Baldwin-Lima-Hamilton supercharged diesel generator set over steam equipment when additional capacity was needed at the municipal power plant in Quakertown, Pa. "After operating a little over a year, it has proved itself exceptionally economical in lube oil and fuel consumption," reports plant management.

Safeguarding this performance are two Ross Exchangers, controlling lube oil and jacket water temperatures. Efficient engine operation is assured.

Widely known for their ruggedness, compact design and matchless thermal efficiency, Ross Exchangers, are regularly installed by most diesel engine manufacturers . . . for both land and marine service. Completely pre-engineered and fully standardized they're available in a wide range of sizes to meet your needs.

For informative literature, request Bulletin 2.1K5. Ross Heat Exchanger Division of American-Standard, 1425 West Avenue, Buffalo 13, N. Y. In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

ROSS

ROSS HEAT EXCHANGER PRODUCTS

Now Warranted

FOR 100,000 MILES

---or 1 year

---or 4,000 hours

Simple as ABC

— only three essential parts

A—

B—

C—

— minimizes both major and minor critical orders of vibration

Patented in U. S. A. and foreign countries

The performance and dependability of the fully patented Houdaille Viscous Torsional Vibration Damper is well known to more than 25 makers of gasoline and diesel engines.

Since its introduction 10 years ago, it has been smoothing the performance and protecting the life of *millions* of engines.

Houdaille now backs this record with a 1-year, 100,000-mile, 4,000-hour Warranty (whichever occurs first) against defects in workmanship and material . . . the *first* of its kind in the industry.

Houdaille engineers will be glad to design a Viscous Torsional Vibration Damper to meet the individual characteristics of your engine, large or small.

HOUDAILLE INDUSTRIES, Inc.*

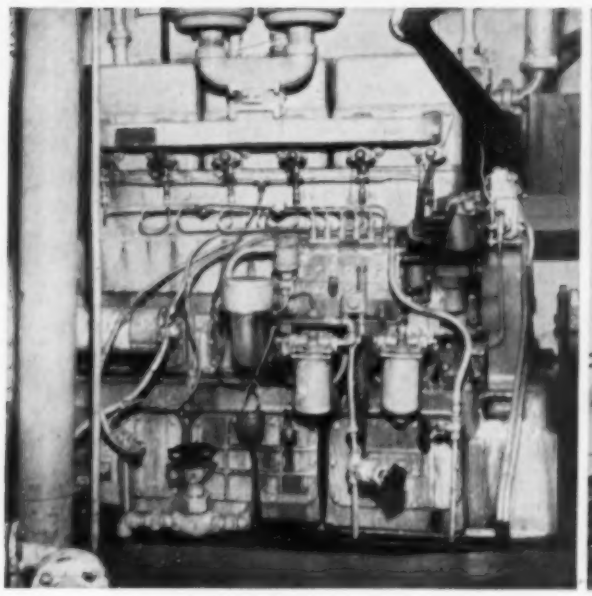
BUFFALO HYDRAULICS DIVISION | 537 East Delavan Avenue, Buffalo 11, N. Y.

**formerly Houdaille-Hershey Corporation*

The Engineer's Field Report

CASE HISTORY
RPM Delo Marine
LUBRICANT Lubricating Oil
W.R. Chamberlain Co.,
FIRM Portland, Oregon

Marine generator shows no bearing wear after 6500 hours steady operation



THIS BUDA DIESEL AND THREE OTHER GENERATORS aboard the M/V C-Trader supply power 24 hours a day for all ship's lights. Each unit uses RPM DELO Marine Lubricating Oil—a specially developed lubricant for high-output, low-speed marine diesels. Chief Engineer, Bob Mader (above), took down this 40 kw. Buda after 6500 hours continuous constant-speed operation, found bearings and rings clear, free of lacquer deposits—no noticeable bearing wear.

FOR EXPERT HELP, Standard Marine Fuel and Lubricant Engineers in Seattle, Portland, San Francisco and Los Angeles will give ship operators expert help at any time.

FOR INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor, write or call any of the companies below.

TRADEMARK "RPM DELO" REG. U. S. PAT. OFF.

W. R. CHAMBERLAIN CO. operates the C-Trader as a coastwise lumber vessel between Oregon and Los Angeles. Its main engine, a 1325 h.p. Cooper-Bessemer is also lubricated with RPM DELO Marine Oil—available in all principal ports.

Why RPM DELO Marine Lubricating Oil prevents wear

Special inhibitors fight deposits... solve residual fuel problems...help prevent scuffing

Contains anti-oxidant. Film stays on parts whether hot or cold; running or idle

Corrosion and foam inhibitors stop bearing corrosion, prevent foaming in wet or dry sump engines

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
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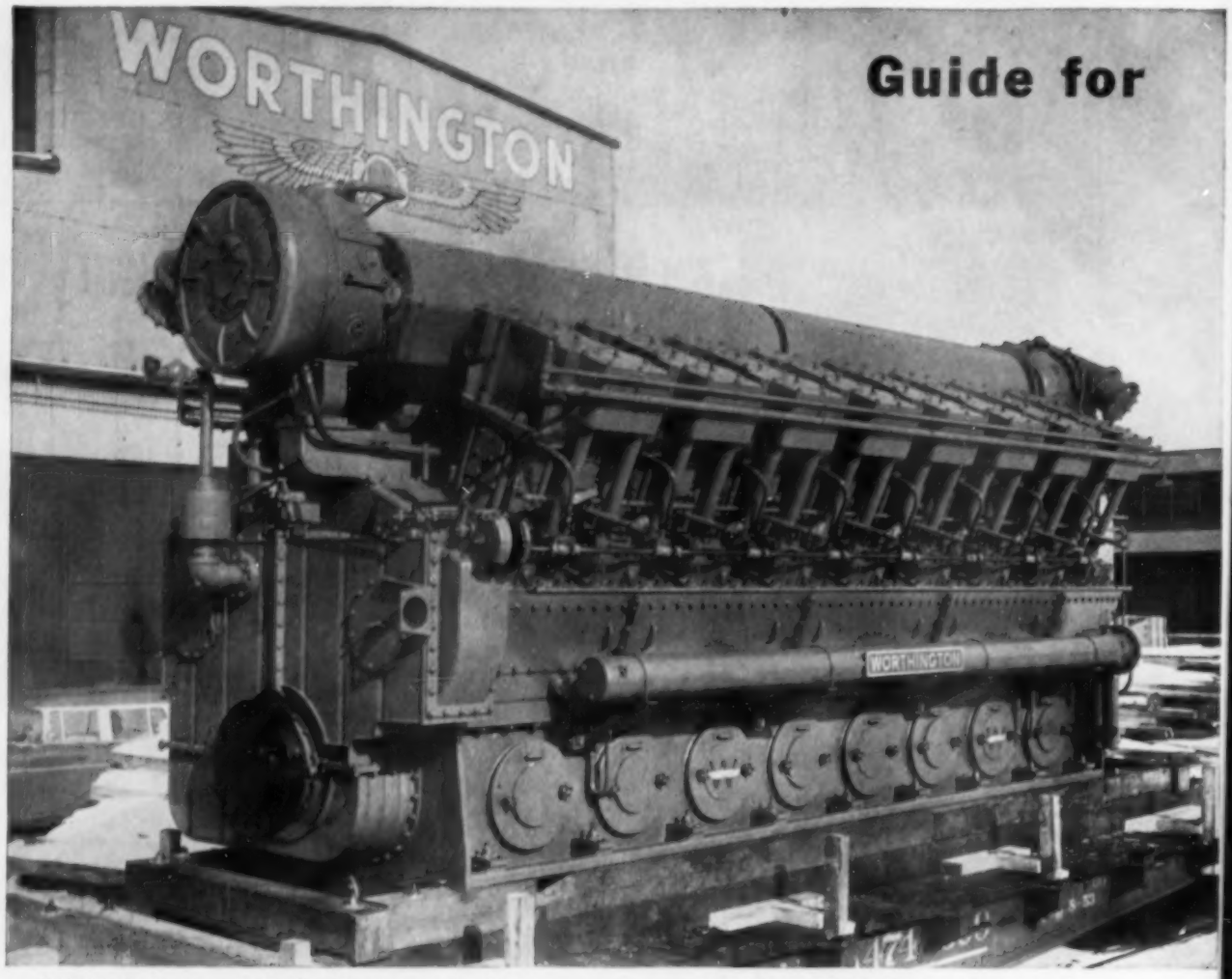
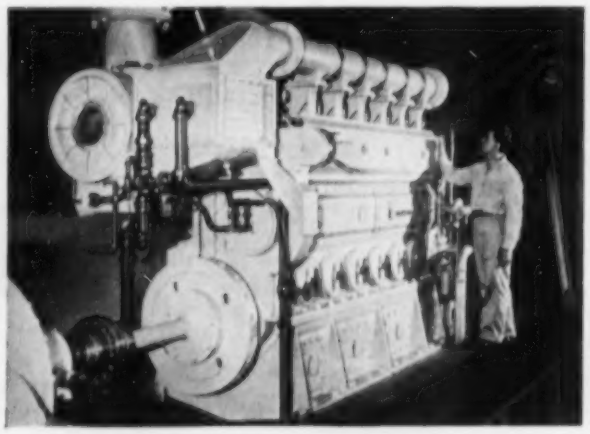
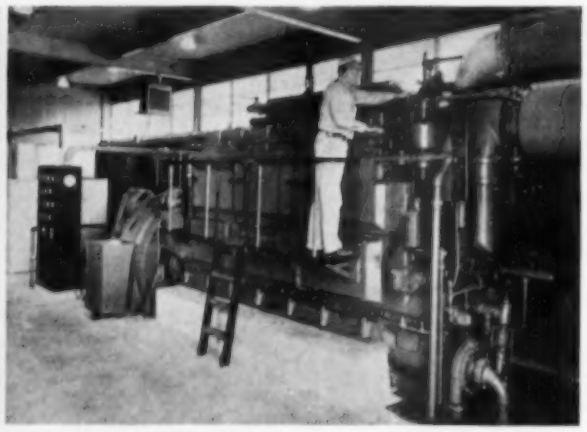
Guide for



SW 14. Designed specifically for turbocharging, Worthington's SW 14 engine features compact and massive construction for low installation expense, plus high performance on the most economical fuels available. This is America's first engine structurally designed and built for high pressure turbocharged operation. Available in ratings from 1,500 to 5,000 hp.



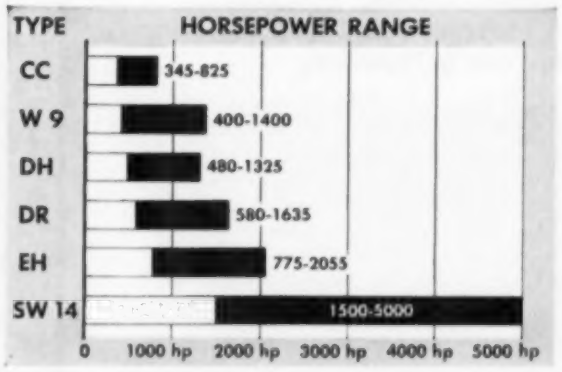
W 9. A medium speed engine of welded steel construction with a very low weight per horsepower ratio. Perfect for permanent power installations, it is easily adaptable for all portable applications such as rail cars, marine, drag lines, locomotives. Ratings from 400 to 1,400 hp.



DH. A modern medium speed engine suitable for permanent or semi-portable service. This unit has a long, successful field record with military, marine, industrial, and municipal applications. Ratings from 480 to 1,325 hp.

Planning Better Diesel Power Plants

Standard engines that fit your plant design are more reliable, have lower first cost, give economical continuous power.



Choose your next power engine from Worthington's complete line

Now, Worthington offers you one of the most complete lines of heavy-duty diesel engines in the industry. You can choose from seven different types to meet almost any application requirement. They're available in ratings from 345 to 5,000 hp and for either oil, gas, or dual-fuel operation.

Hi-power performance with economy is yours with all Worthington diesels because each type has been engineered specially for its power range and service application. Such exclusive features as Dual Plunger Fuel Pumps, Automatic Thermal Air Control, Micro-metering Gas Valves and Self-aligning Exhaust Valve Seat Inserts make a Worthington diesel your best choice for long life and low maintenance.

Service is also a Worthington specialty. Experienced erectors will help supervise the installation of all Worthington engines. After your diesel is installed, complete service facilities stand behind it to assure you of continuous, economical power. If you should need replacement parts or repairs of any kind, you'll get fast action from the nationwide Worthington organization.

More than 3,000,000 hp of Worthington power engines are now serving industry in many different applications. If one of these engines is in your plant then you already know of Worthington's ability to combine outstanding performance with economy. If not, you'll want to get the full story from your nearest Worthington District Office. Or write to Section E62, Worthington Corporation, Harrison, N. J. In Canada: Worthington (Canada) 1955, Ltd., Toronto, Ont.

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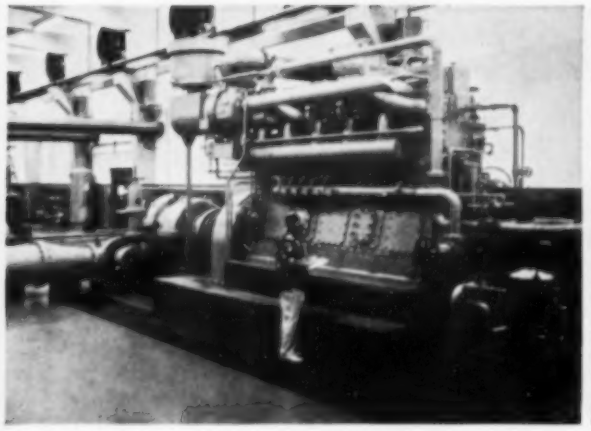
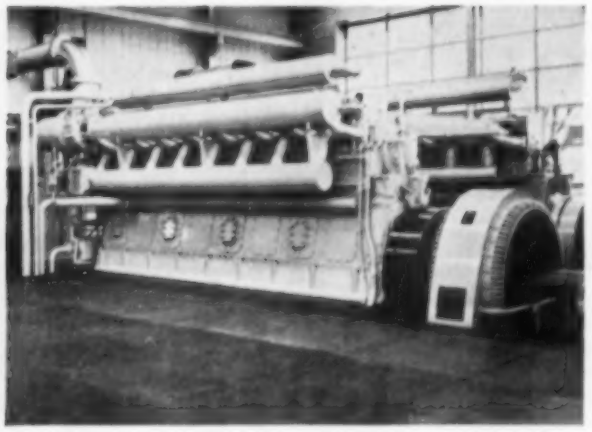
WORTHINGTON

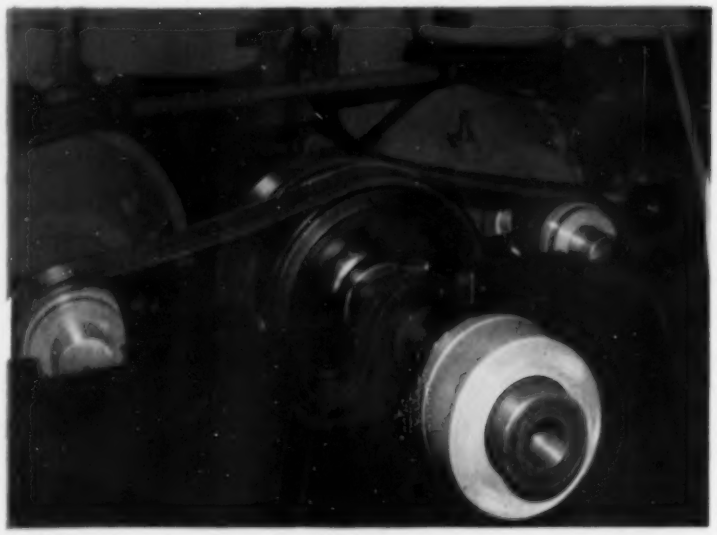


DR. A low speed heavy-duty engine designed to operate on the lowest cost available fuels. Will give dependable service as an oil diesel, dual-fuel diesel, spark ignition engine, or on tri-power service. Ratings from 580 to 1,635 hp.

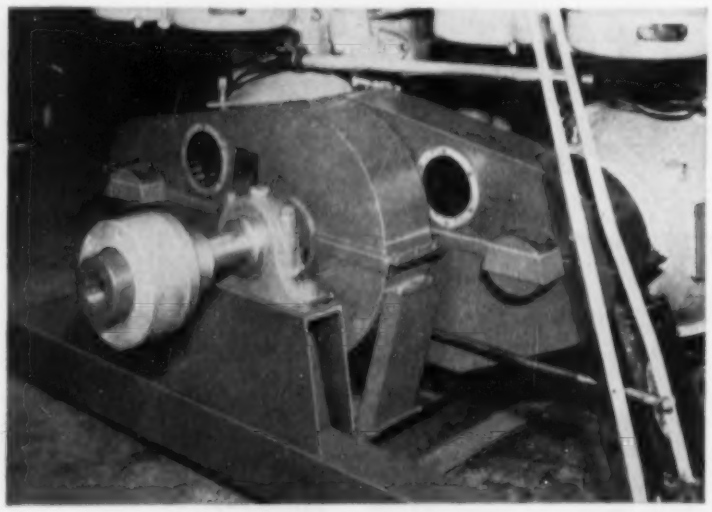


EH. A rugged engine for continuous, heavy-duty service. More than 500 type EH engines are in service in private, military, municipal, and utility power plants. In many of these installations, Worthington diesels are setting new records for continuous operation. Ratings from 775 to 2,055 hp.

Get Maximum HP Output from High-Speed Diesel Engines with Morse Hy-Vo Drives



Note the smooth action of Morse HY-VO in operation. Matched 182-HP diesel engines, operating at 1450 RPM, are twinned through HY-VO Drives to jack shaft, which operates at 650 RPM. Jack shaft delivers 364 HP to load shaft (not shown), to which it is coupled with Morse Morflex Radial Coupling (see below).



Twin HY-VO Drives are encased in sealed casings, permit continuous forced-spray and sump oil lubrication. Observation ports permit inspection. Morflex Radial Coupling cushions any shock loads from driven unit, prevents engine pulsations from entering driven shaft.

Southern Bearings Service and Lewis-Diesel Engine Company solved difficult cotton gin drive problem at low cost to customer.

Morse Hy-Vo Drives helped solve a typical power-transmission problem for Lewis-Diesel Engine Company (Memphis, Tennessee). Working with Southern Bearings Service, Inc., the local Morse distributor, they combined twin high-speed diesels with two Morse Hy-Vo drives to get low-cost, low-speed, high-horsepower output to a cotton gin main drive.

By compounding two small, high-speed diesel engines with required reduction ratios, the need for a big, expensive, low-speed engine was eliminated. Quick access to individual drive units was made possible without disturbing main compound base. Customer downtime is reduced to a minimum.

Compact Morse Hy-Vo Drives provide smooth, positive power transmission at speeds up to 8,500 fpm. They combine the positive action of gears with the favorable load distribution of chain; are rated at 20,000 hours' service life.

HY-VO Drive links, showing exclusive rocker-type joint. Rocker joint reduces wear and friction, results in coolest running chain drive.

Complete information free

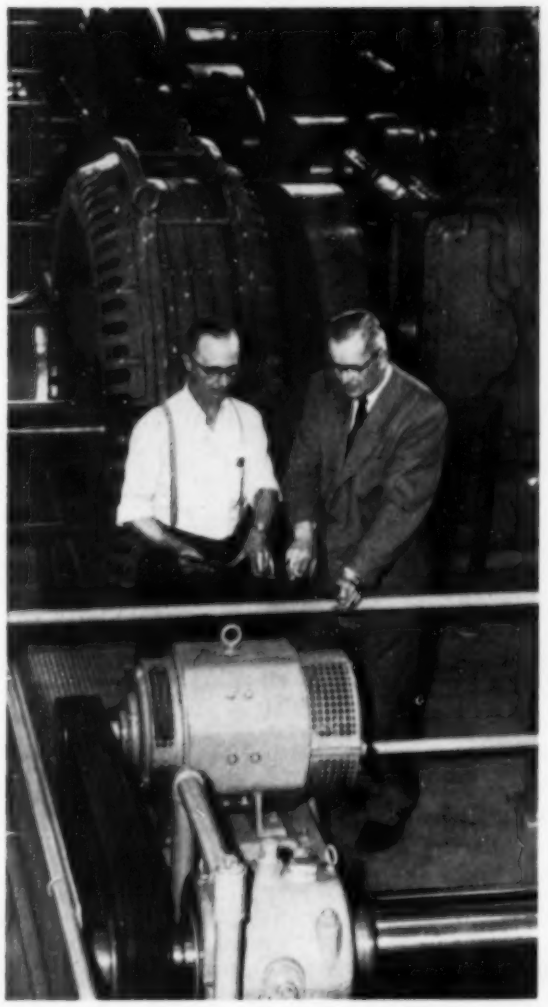
For complete information and engineering assistance on Morse HY-VO Drives, contact your nearest Morse distributor. Write, wire, or call him today.

MORSE CHAIN COMPANY
INDUSTRIAL SALES DIVISION
ITHACA, N.Y.

MORSE BW *Trademark **POWER TRANSMISSION PRODUCTS**

This utility gets better engine performance . . . less cylinder and ring wear with STANODIESEL Oil M

Report on Cumberland, Wisconsin, Municipal Utility's experience with diesel lubricants.



Clarence Maxcy (left), Chief Engineer at Cumberland, and Standard Oil lubrication specialist Ralph Rowlands check efficiency records of utility's engines lubricated with STANODIESEL Oil M. Providing technical service on lubrication problems is something for which Ralph Rowlands is well qualified. He has been doing this sort of work with Standard for 13 years. Ralph attended the University of Wisconsin and is a graduate of the Standard Oil Sales Engineering School.

Management of Cumberland, Wisconsin, Municipal Utility found a way to extend time between ring changes, to get greater fuel efficiency and to cut cylinder wear. How? By using STANODIESEL Oil M.

Before converting to STANODIESEL Oil M, the utility found it necessary to change rings every 1,500 to 2,500 hours. Cylinder wear ranged up to .003" per 1,000 hours of operation. After the engine was converted to STANODIESEL Oil M, it was run 7,800 hours at 50 to 90 per cent of full load. No rings had to be replaced during that time. The engine was then overhauled. All rings were free. All pistons were clean and in excellent condition. Ring wear was apparent on the two top rings only, bottom rings were like new. Cylinder wear after 7,800 hours averaged .003". This amount of wear occurred after 1,000 hours with the oil formerly used. On some cylinders, wear was only .001". Maximum bearing wear was .0005". Fuel efficiency over the period averaged 12.93 K.W.H. per gallon.

This kind of performance—reduced wear, increased fuel efficiency, improved overall engine performance—is what you can expect from STANODIESEL Oil M. Find out more. Call your nearby Standard Oil lubrication specialist. There is one near you in any of the 15 Midwest and Rocky Mountain states. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY
(Indiana)

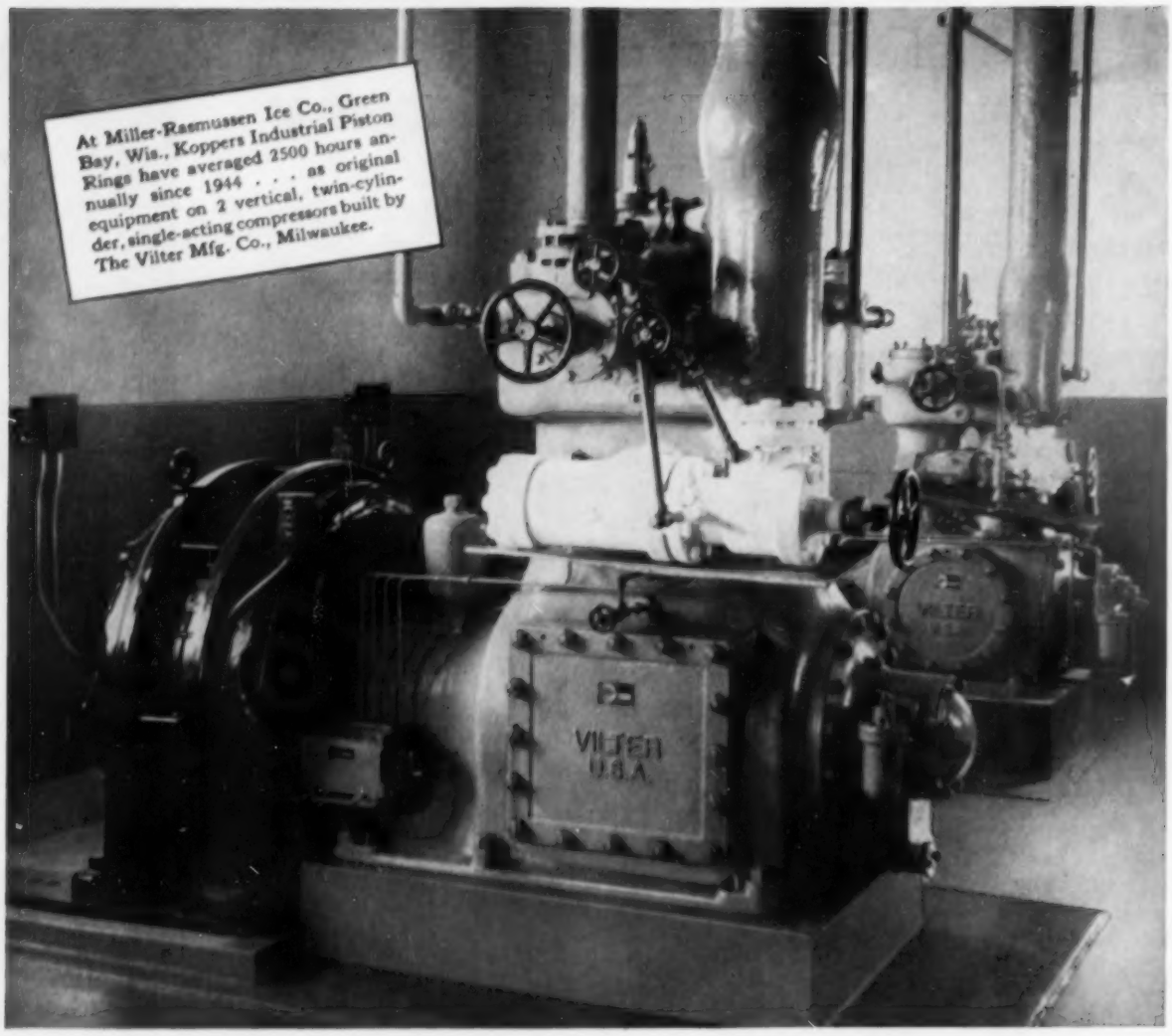
Piston from engine using STANODIESEL Oil M photographed just as it was pulled for 7,800 hour overhaul. Piston is clean and in excellent condition.

Quick Facts About
STANODIESEL Oil M

- Is refined from highest quality base stock. Has superior stability.
- Contains special additives that:
  - Inhibit oxidation, control unwanted increases in oil viscosity.
  - Keep crankcase, pistons, cylinder walls and other parts clean.
  - Keep contaminants in suspension, prevent them from depositing.
  - Control foam, make oil suitable for use in hydraulic governors.
  - Increase the oil's ability to reach and maintain a film on highly stressed parts.

STANDARD

CH-1493-


At Miller-Rasmussen Ice Co., Green Bay, Wis., Koppers Industrial Piston Rings have averaged 2500 hours annually since 1944 . . . as original equipment on 2 vertical, twin-cylinder, single-acting compressors built by The Vilter Mfg. Co., Milwaukee.
VILTER
U.S.A.

Koppers Piston Rings go 10 years without repair, replacement or oil waste!

Like Miller-Rasmussen Ice Co., you can reduce maintenance costs and time and increase operating efficiency with Koppers Industrial Piston Rings. You can profit from longer piston ring life . . . longer cylinder life . . . and eliminate piston ring feather, scoring and scuffing.

Koppers American Hammered Industrial Piston Rings prolong the lives of Diesel, gas, aircraft, gasoline and many other engines, valves and compressors. Rings range in diameter from 1 inch to 10 feet . . . are of cast iron and special alloy cast irons; they may be chromium-plated for added durability.

Our field engineers in your area will be glad to unravel your knottiest piston ring problems and help provide you with a new high in piston ring performance. They'll check your present piston rings in operation . . . recommend the proper ring type . . . or even have a ring designed for your specific application.

Bring your piston ring problems to Koppers. Phone or write: KOPPERS COMPANY, INC., *Piston Ring and Seal Dept.*, 1406 Scott St., Balto. 3, Md.

Koppers Company, Inc.
Metal Products Division
Piston Ring and Seal Dept.

***Engineered* Products**
Sold with *Service*

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AMERICAN HAMMERED
Industrial Piston Rings

With SHELL ADC* Oilprint Analysis...

Part of the fleet operated by Cleveland-Lorain Highway Coach Co., Lorain, Ohio, lubricated by Shell Rotella Oil and protected by Shell ADC* Oilprint Analysis.

"Extended oil drain intervals... lower repair costs"

HERE'S ANOTHER transportation company that has found the Shell ADC* Oilprint Analysis a cost-saving tool of preventive maintenance. By its use, oil drain intervals have been extended safely on some new diesel coaches.

Furthermore this fast, reliable oil check has revealed many potential troubles in advance, such as oil contamination due to block fracture . . . in time to save costly repair bills. The Cleveland-Lorain Highway Coach Co. is enthusiastic about it.

The Shell ADC Oilprint Analysis enables fleet operators to test crankcase oil in the short time allotted for re-fueling and crankcase oil checks . . . mere *minutes*. It eliminates draining still-good oil and the risk of using oils loaded with contaminants.

Let us demonstrate how we can put this new cost-saving PM tool to work for you.

*Trademark

One Drop tells the Story!

The operator places just one drop of oil on the card. Analysis gives conclusive check of oil's condition.

SHELL OIL COMPANY

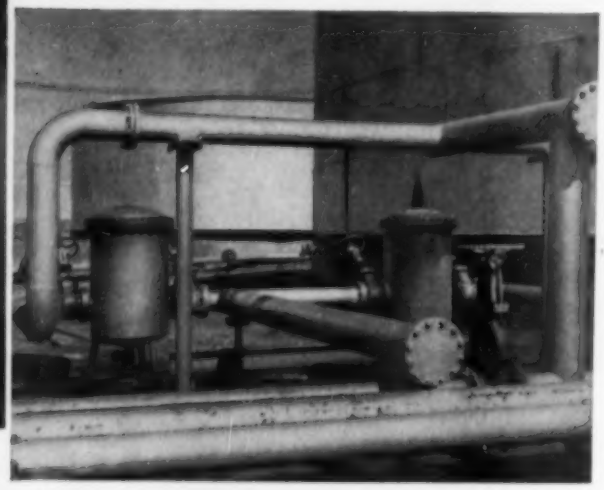
50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

at the curb new Purolator dual fuel filter, PAG-25D, has a high flow rate of 25 GPM for diesel fuel combined with virtually no pressure drop. A final assurance to every customer that your product is clean.

or

at the terminal large bulk filtration equipment like this pedestal-type filter (PAG-300L to 1200L) can be used at high flow rates of from 300 to 1200 GPM. Reduces meter wear.



Purolator micronic® fuel filters remove rust

Despite rigid checks which prove the purity of fuel as it leaves the refinery, subsequent corrosion in storage tanks and pipes frequently contaminates it with particles of iron oxide. To remove rust particles, Purolator's engineers have developed the world's finest line of bulk filtration equipment. A recent addition to this line is Purolator's new curb pump filter. It has a filtration area of over 1800 square inches, achieved by 2 resin impregnated micronic fuel filters operating in parallel. Its development helps make certain that wherever you filter diesel fuel or gasoline ...at the curb or at the terminal...you can get precisely the right filter from Purolator.

PUROLATOR

"FIRST IN THE FIELD OF FILTERING"

PUROLATOR PRODUCTS, INC., Rahway, N. J., and Toronto, Ontario, Canada

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Purolator Products, Inc.,
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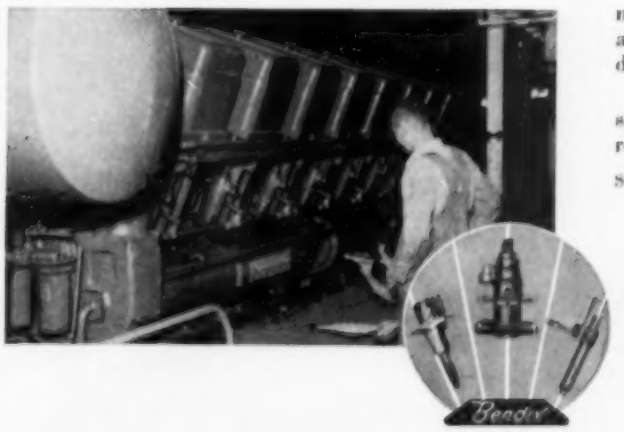
75% FUEL SAVING!

NORDBERG 2800-H. P. DIESEL WITH Bendix INJECTION EQUIPMENT



When the sixteen-year-old dredge "Port Arthur" was modernized with the installation of a new 2800-h.p. Nordberg Supairthermal® V type Diesel with Bendix* fuel injection equipment, a number of very amazing results occurred.

During an early major assignment, pumping production was increased 64 percent. Production per gallon of fuel jumped from 7 to 12.3 cu. yds. per gal., a saving of 75.7 percent. In addition, the new 16 cylinder engine supplies 1050 more horsepower at the pump and provides the Port Arthur with a maximum capacity of 50,000 cubic yards per day.

There is no question about it—efficient, new equipment pays off in a big way. And there is no question about the choice of Bendix injection equipment for dependable, economical operation.

That's why so many leading diesel manufacturers specify Bendix for their fuel injection equipment requirements.

*REG. U. S. PAT. OFF.

SCINTILLA DIVISION OF BENDIX AVIATION CORPORATION
SIDNEY, N. Y.

Export Sales and Service: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

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THE NEWEST AND
MOST FLEXIBLE CONCEPT
IN DIESEL OR GAS ENGINE
ELECTRIC DRILLING RIG POWER

RIGELE

Greater Flexibility
Choice of Fuel Selection
Simple Controls
Low cost maintenance and parts

PLEASE WRITE FOR COMPLETE DETAILS

DESIGNED AND BACKED BY
STEWART & STEVENSON

AVAILABLE THROUGH RIG MANUFACTURERS
AND SUPPLY STORES

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SERVICES, Inc.

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Branches: Corpus Christi, Dallas, Lubbock, San Juan, Odessa.

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Distributors of: General Motors Diesel Engines, Climax Blue Streak Engines, Chrysler Industrial and Marine Engines, Porter Diesel Engines.

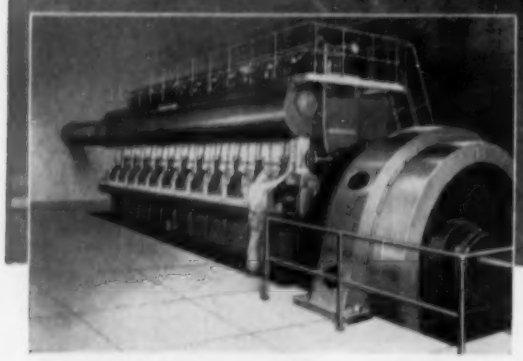
Manufacturers of: Electric Power Units, Electrical Control Equipment, Portable Pumping Units, Rod Hoist Pumps.

Export Office: Room 1405, 74 Trinity Place, New York, N. Y. Phone DIgby 4-4656.

STEWART & STEVENSON

THE NATION'S LARGEST DISTRIBUTORS OF DIESEL ENGINES

*"RIGELECTRIC" REGISTERED TRADE MARK FOR STEWART & STEVENSON DC DRILLING RIG POWER



The crankshaft harnesses 6190 horsepower developed by this Nordberg 12 cylinder Diesel engine to generate 4840 gross kilowatts of electric power.

Forging Weight 108,460 Pounds
Finished 12 Throw Crankshaft
46,400 Pounds

FROM a giant 210,000 pound, 72 inch ingot, poured at Erie Forge & Steel, came this 12 throw crankshaft . . . the largest ever made.

Within our plant this giant was machined down to 46,400 pounds fighting weight; the finished crankshaft is 43 feet 9 inches long by 15½ inches journal diameter. Bearing surfaces are polished to a mirror finish.

It is one of many such forgings followed step by step from raw material to shipping dock within the Erie Forge & Steel Corporation's plants.

Another convincing proof of the way "One Responsibility and One Control" at Erie Forge & Steel can work for you to your specifications for steel forgings and castings.

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Governor theory, operation, and maintenance are covered in frequent classes conducted for visiting users of our products.

We're proud of our plant. Modern . . . immaculately clean . . . here highly skilled members of our industrial family produce precision Woodward Governors under the most favorable conditions. Stop in and visit us the next time you are in the vicinity of Rockford. We'll be glad to show you "The Woodward Way".

Visitors watch a machine operation in our shop. All work areas are well-lighted and air conditioned.

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Rockford, Illinois

WORLD'S OLDEST AND LARGEST MANUFACTURER OF HYDRAULIC GOVERNORS EXCLUSIVELY

Mid-Continent Diesel News

By Jack F. Cozier

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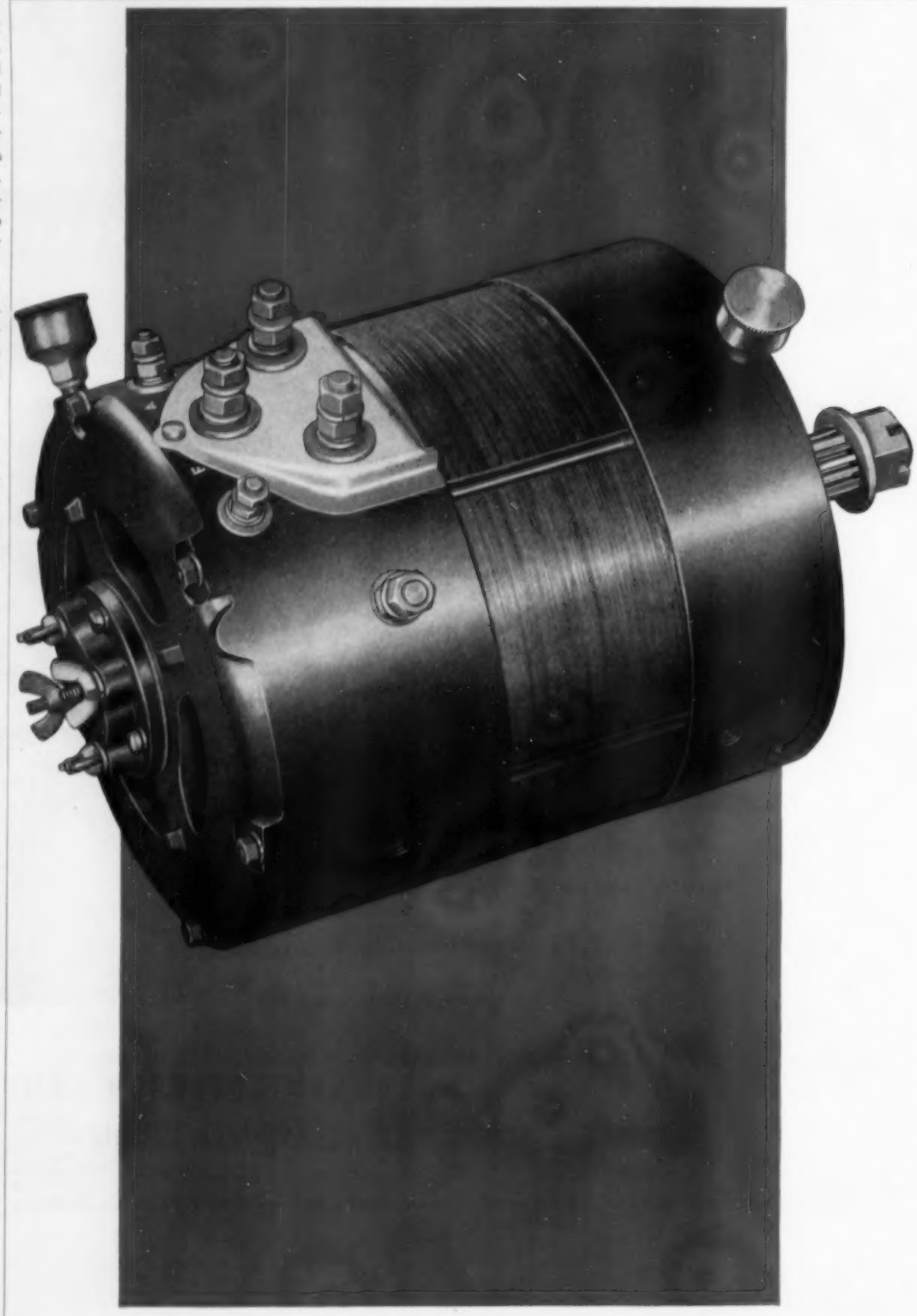

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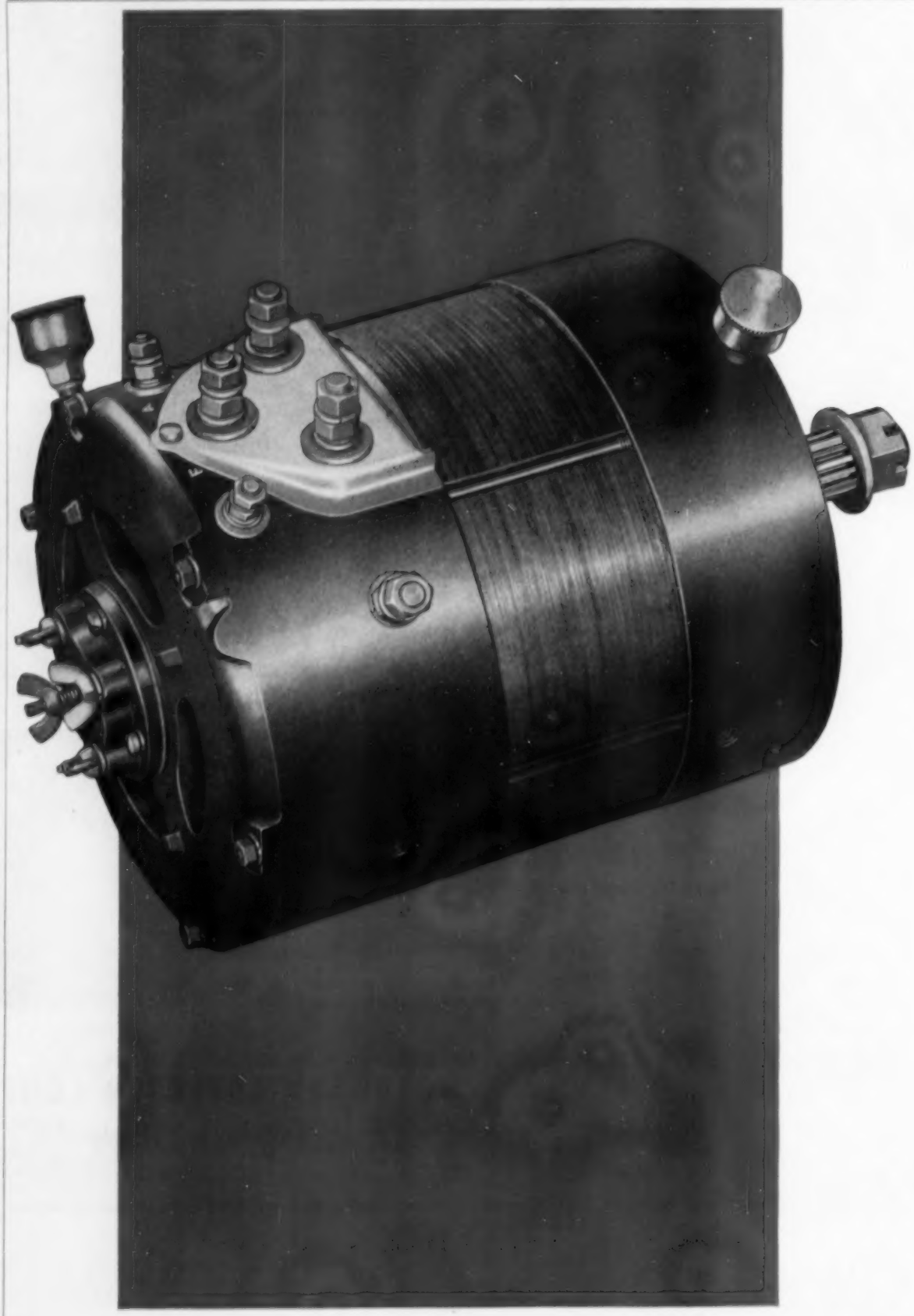

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Florida Diesel News

By Ed Dennis

COMPANIA POPULAR de Transporte, Inc., of San Juan, Puerto Rico, has awarded a contract to Miami Shipbuilding Corp. for the design and construction of two 55 ft. steel hulled ferry boats. The propulsion for each will be supplied by a model HRMS-602.5 Cummins diesel engine rated 225 hp at 1800 rpm, with Capitol hydraulic 2.5:1 r&r gears; from Cummins Diesel Engines of Fla.

AT JACKSONVILLE, the Gibbs Corp. supplied the Caterpillar diesels for 3 fishing trawlers, a D342 in the *General Patton* of Brunswick, a D326F in the *Donald Ray* of Mayport and a D13000 in the fishing trawler *Dell D.*

TWO General Motors model 6-110 diesels were installed in two new Cape Hatteras trawlers. One in the 68 ft. *Theresa R* of New Bedford, Mass.; and the other in the 55 ft. *Golden Dawn* of Gloucester, Mass. Both were built by the Morehead Shipbuilding Co. of Morehead, N. C.

THE CITY of St. Petersburg's sewage disposal plant has a new Allis-Chalmers diesel engine model 8DCG1125 with a 150 kw Allis-Chalmers generator.

PORT au Prince, Haiti, was the destination of a D7 Caterpillar tractor, with two D6's, two D8's, two D4's and a DW21 series C tractor hooked to a PRB21 hydraulic scraper shipped via the *Inagua Trader* or its sister *Inagua* freighters.

TWO Worthington diesels each 5 cylinders and rated 300 and 345 hp with 235 kw Electric Machinery generators at the City of Tampa sewage disposal plant. Gas from the plant is used to run the engines. Hilco Hyflo lube oil filters are used.

NEW GM dieselized hi-way tankers include a 6-71 in a GMC tractor for the Orange State Oil Co., operating out of Port Everglades and a similar installation in a Tamiami Freightways hi-way freighter.

ANOTHER 150 hp HM-600 Cummins diesel for Wells Bros. of St. Augustine and Key West, in addition to the four Cummins already received from Cummins Diesel Engines of Florida. These are being installed in trawlers.

THE MIAMI branch of Detroit Diesel Div., GM, sold a 6-110 rated 300 hp for the yacht *Hesperus* and a model 3031C with a hp rating of 102 for installation in a dredge owned by the Dolite Rock Co.

ANOTHER 8x10 Enterprise diesel model DMM 363 rated 450 hp at 900 rpm to be installed in a tugboat by Dade Drydock Co. Also included are Snow Nabstedt r&r gears and Ross heat exchangers.

THE Jacksonville branch of the Detroit Diesel Engine Div of GM supplied a model 62203 for the 67 ft. *West Wind*, owned by Sohlman Seafoods of Tampa, plus two 6-71's in the 35 ft. tug *Becky*, owned by Gulf Atlantic Transportation of Jacksonville.

EIGHT 10 cylinder Fairbanks, Morse diesel engines for Hicks & Ingle Co. of Charlotte, N.C. These model 38F5¼ diesels are rated 825 hp each.

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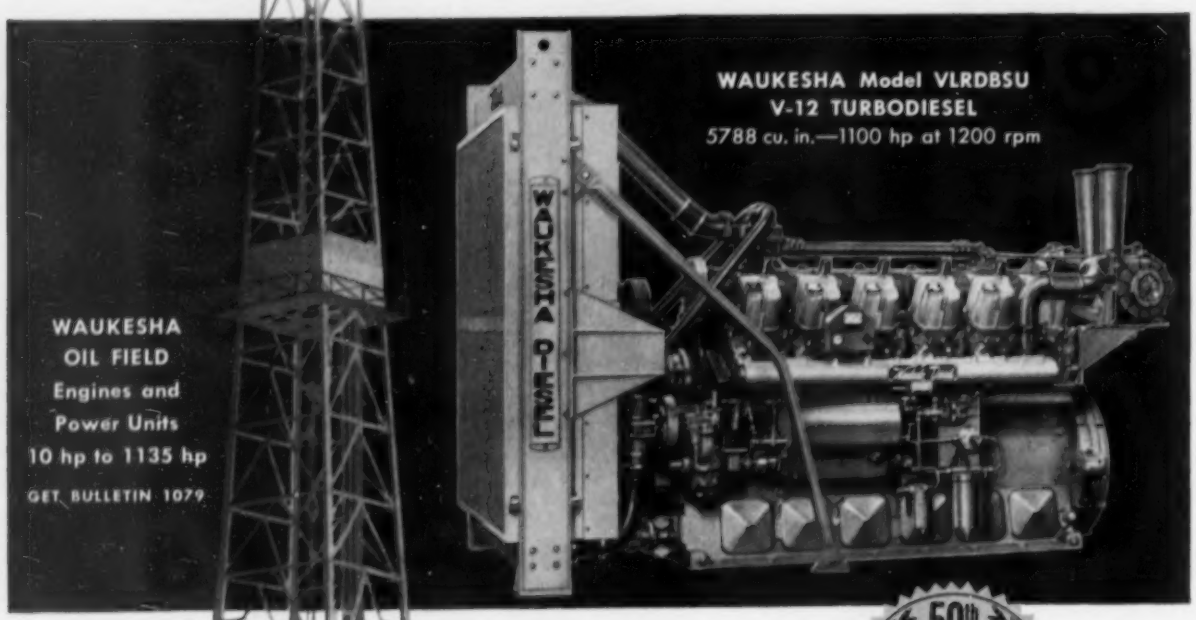
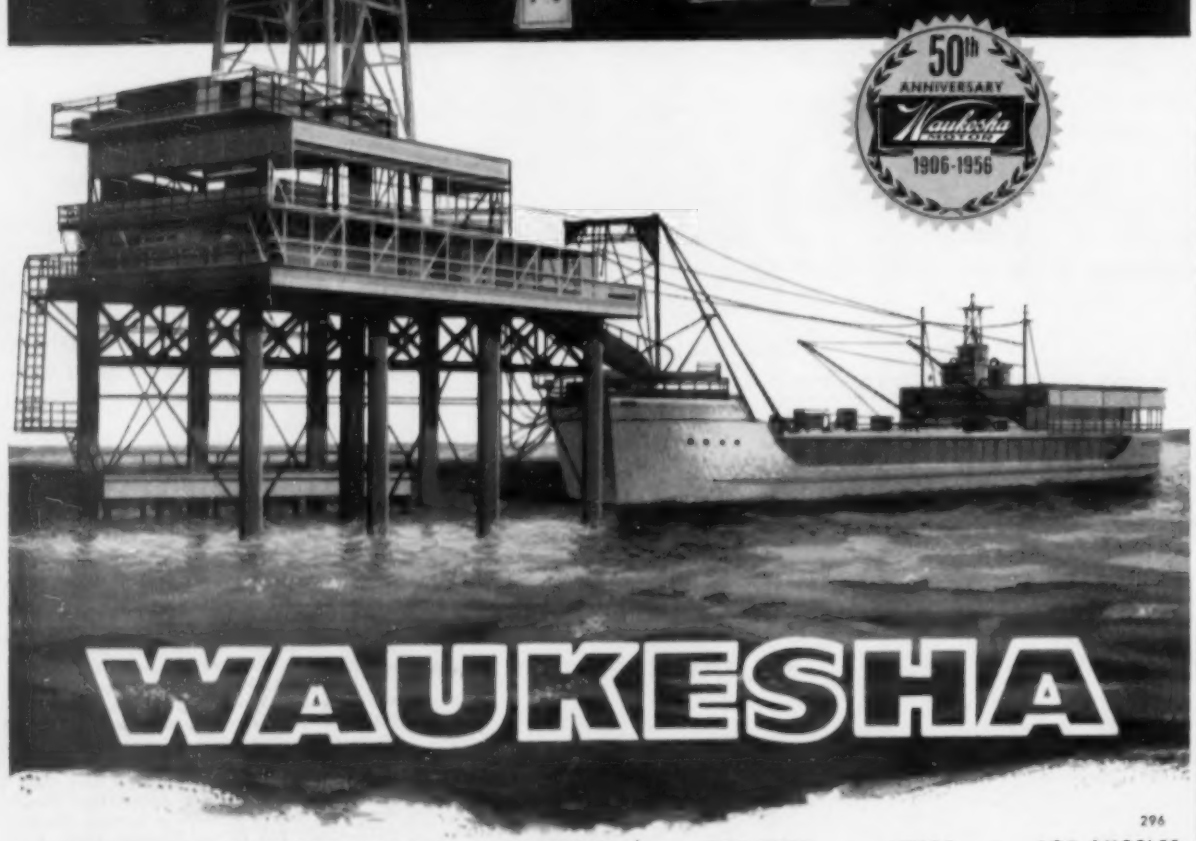
FOR off-shore DRILLING





WAUKESHA

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WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN • NEW YORK • TULSA • LOS ANGELES

Cooper-Bessemer Compressor Catalog

A new engineering catalog describing the newest Cooper-Bessemer Type FMP compressor is available on request. The Type FMP reciprocating compressor is built for field pick-up service, gas boosting, air drilling and general industrial use. It is available with either single or twin frames, with single or multi-stage compressor cylinders. Ratings are up to 600 horsepower as belt-driven or completely "packaged" unit.

Write The Cooper-Bessemer Corporation, Mount Vernon, Ohio, and request Bulletin No. F-80.

Top Management Promotions

T. H. Belling, President of Fram Corporation, Providence, R. I., announced changes affecting key personnel at Fram and its subsidiary companies: The Warner Lewis Company, Tulsa, Oklahoma, and Fram Canada Limited, Stratford, Ontario. Steven B. Wilson, Chairman of the Board of Fram Corporation, was elected honorary Board Chairman of Warner Lewis. J. Norman Fitzgerald was named President succeeding Warner Lewis who took over as Chairman of the Board. Frederick J. Knight was named President of Fram Canada, Charles B. Benton Vice-President in Charge of Sales, Paul Hartz was elected Vice-President and Treasurer.

New Centrifugal Pump

A new centrifugal pump has recently been developed by Gardner-Denver Company of Quincy, Illinois. Known as the Gardner-Denver Model BL, the new pump is claimed to provide high efficiency over a broad range of service conditions. Each size of the BL handles a a wide range of pressures and capacities and each will accommodate fluctuations in either pressure or capacity without serious loss of efficiency.

The new Gardner-Denver BL centrifugal is available in five sizes of 2-in., 3-in., 4-in., 5-in. and 6-in. Each size is designed with heavy-duty ball bearings, factory lubricated to minimize lubrication troubles. Each size has an extra large shaft to maintain perfect alignment, and a strong supporting frame. Also, in step with improved centrifugal pump design, according to the manufacturer, a trouble-free mechanical seal replaces the stuffing box. (ITS NEW)

Elected Chairman of the Board

Ralph F. Peo, president of Houdaille Industries, Inc., has been elected chairman of the board and will serve in both capacities. Mr. Peo, as chairman, succeeds Charles Getler, who was associated with one of the original companies that formed Houdaille-Hershey Corporation, and who is retiring from active business. Wade Stevenson has been elected a director to succeed Mr. Getler who also is retiring as a member of the board. Mr. Stevenson, a leading Buffalo industrialist, is president of Eastman Machine Company, a director of the Manufacturers & Traders Trust Company of Buffalo, a trustee of the Western Savings Bank of Buffalo and a director of many other corporations.

Houdaille Industries, Inc., is engaged upon a program of diversification to add to the automotive, aviation, refrigeration, automatic lubricating equipment, projectiles, small arms, custom forgings, hand tools, silencers and stone products produced in its plants in Buffalo, Detroit, Chicago, North Chicago, Huntington, W. Va., Cleveland, Decatur, Ill. and Oshawa, Ont. The corporation just recently acquired the 13 properties of the North Jersey Quarry Company.

A few of the thousands of crankshafts produced at National Forge for new diesel engines.

HAVE YOUR CRANKSHAFTS RECONDITIONED BY A FIRM EXPERIENCED IN MAKING ORIGINAL CRANKSHAFTS

National Forge has been making crankshafts for diesel engines for many years... starting with our own basic electric steel and ending with a shaft ready to install in original equipment, we have a wealth of "know-how" regarding crankshafts.

Recently, National Forge has added a new crankshaft reconditioning division. This includes a large chromium plating department and additional grinding, straightening, and inspection equipment for handling crankshaft reconditioning on a production line basis.

National Forge's large modern facilities and years of experience in producing new crankshafts assure you of proper handling and good workmanship on your reconditioning jobs.

We will be glad to have our field representative call on you to discuss your needs.

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PRODUCES BETTER STEEL FORGINGS AND MACHINE WORK

IRVINE, WARREN COUNTY, PENNSYLVANIA

Inland River Reports

By A. D. Burroughs

THE NEW 5400 hp towboat now under construction at Nashville Bridge Co., for the Nashville Coal Company is creating considerable excitement along inland rivers. Measuring 177 x 42 x 11 ft. 6 in. this new boat will be one of the largest and certainly the most powerful built up to the present time for inland river service. With delivery scheduled for early 1957, two General Motors (Cleveland) turbocharged diesel engines will deliver this 5400 hp for use in handling non-integrated tows of 14-20 huge barges in the Kentucky-Tampa, Fla., coal trade.

A NUMBER of new boats will ply the Illinois waterways soon, equipped with the necessary retractable pilothouse for service in this area, including the new 96½ x 28½ x 8 ft. 8 in. towboat near completion at Nashville Bridge yards for Berwick Bay Towing Company. Built for service in the asphalt trade, this one is equipped with Snow-Nabstedt reverse-reduction gears, and three Fairbanks-Morse OP, 38-F-5½, 8 cyl. diesel engines each rated at 600 hp at 1200 rpm, providing the rated 1800 hp.

THE NEW *George W. Lenzie,* Nordberg powered towboat built by Calumet Shipyard for Material Service Corporation, has joined the fleet of 9 diesel boats for this company. Seven feet longer than the flagship, *Irving Crown,* the engines were built at Nordberg's St. Louis plant, with each of the two Nordberg, four-cycle, six cylinder, Supairthermal engines rated at 800 hp at 273 rpm.

LOTTA BULL is the colorful name for the new triple screw towboat now in service for the Bull Towing Company (Joliet, Ill.). Measuring 96½ x 28½ x 8 ft. 8 in,, built at Nashville Bridge Company, a trio of Fairbanks-Morse Model 31-A-8½ eight cylinder, two-cycle engines, each developing 480 hp provide propulsion power.

A PAIR of Cooper-Bessemer's type JS-8 turbocharged and after-cooled 4-cycle engines, each rated at 1200 hp at 458 rpm provide the propulsion power for the new *Arrowhead.* Now in service for the Midwest Towing Company, this 150 x 33½ ft. craft, built by St. Louis Shipbuilding & Steel Company, gave a fine performance on her recent maiden trip.

EARLY MAY saw the christening of the *Arrowhead's* twin sister, the new *Prairie State.* Also powered with the pair of Cooper-Bessemer JS-8 engines, owned by Midwest Towing Company, and built by St. Louis Ship, the push-power on this new craft is getting favorable reports.

O-KAN, the third Dravo-built Ram-type towboat delivered to the Point Towing Company since September, 1954, is now in action on the upper Ohio. Similar to the two previous boats, the *R. H. Bosworth,* powered by White-Atlas engines, and the 1955 *Jerry Bosworth,* the 1956 edition, also rated at 580 hp, is expected to meet the high performance and economy records established by these boats.

TWO ENTERPRISE diesel engines with a combined rating of 2560 hp will power each of the two new 148 ft. twin-screw towboats now being built for A. L. Mechling Barge Lines, Inc., by Dravo at the Neville Island Shipyards. Scheduled for delivery by mid-summer, the new hull designs are expected to provide even more push-power for these craft.

DALLAS, the new twin screw towboat, marks the seventh diesel towboat completed by Arnold V. Walker shipyard for Coyle Lines, Inc. A sister-ship to the *Birmingham,* delivered last year, this 80 x 33 x 10 ft. vessel will be powered by

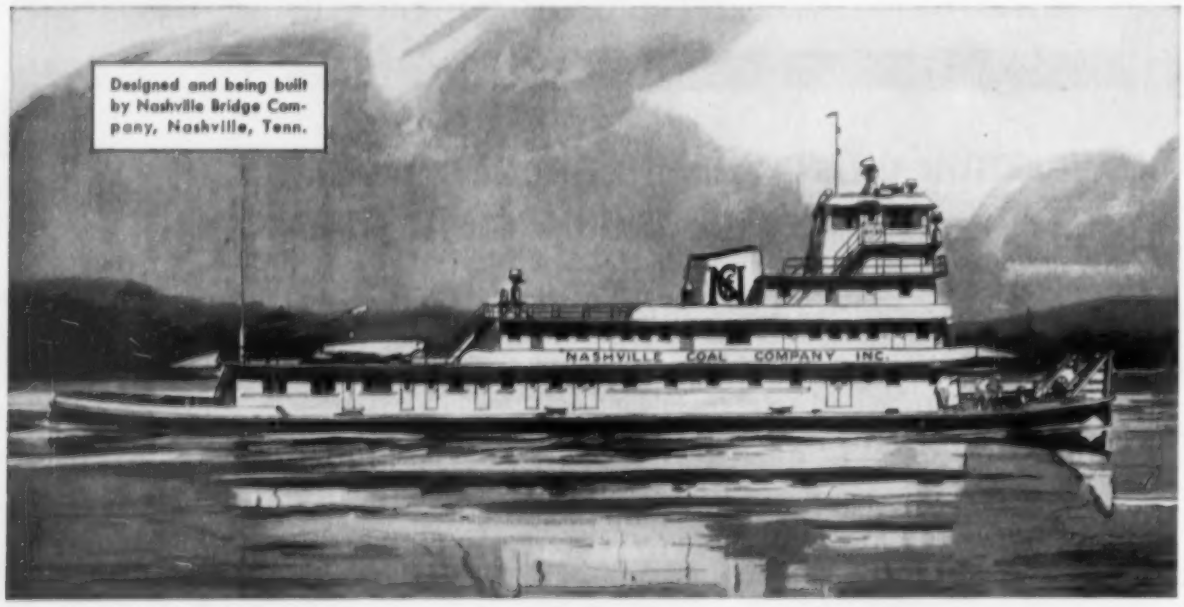
For the Most Powerful Towboat
on the Inland Waterways

NASHVILLE COAL COMPANY PICKS

GM TURBOCHARGED DIESEL POWER

Two General Motors Turbocharged Diesel engines deliver 5400 shaft horsepower for Nashville Coal Company's new towboat, which will make it the most powerful on the inland waterways.

Turbocharging gives a GM Diesel 75% more power with virtually no increase in engine size and a big reduction in weight per horsepower. And horsepower for horsepower, a GM Turbocharged Diesel costs less to install, run and maintain. Whatever your power needs may be—tugs, tankers, towboats, dredges, cargo ships or any other application—you'll have a better investment if you specify a GM Turbocharged Diesel. Your local Cleveland Diesel Engine Division representative can give you the facts—or write direct for more information.



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GM CLEVELAND DIESEL

the twin Fairbanks-Morse Model 38D engines, each rated at 585 hp.

THE NEW 2160 hp *City of Huntington*, near completion at St. Louis Shipbuilding and Steel Co., will join the Ohio River Company fleet. It is to be similar to the twin-screw boats placed in service last year for this company, the popular *Mike Creditor* and *A. L. Long*, equipped with Baldwin-Lima-Hamilton engines.

A BRAND NEW trio of sister boats, built at Nashville Bridge, are now in service for their owner, the Crouse Corp. Named in order of their delivery, the *Eleanor*, the *Barbara*, and the *Jincy*, each towboat is powered by General Motors (Cleveland) Model 12-567 engines for service in the Ohio and Tennessee River coal trade.

AT THE Paducah, Kentucky yards, Igert, Inc., a new 1,000 hp towboat is being built for Lea River Lines, Inc. Two 500 hp Caterpillar diesels will provide main propulsion power.

TWO 200 hp Model NHM-600 Cummins diesel engines were recent purchases from the Cummins Diesel Sales Corporation in Peoria, Illinois by the C&IM Railroad to repower a workboat.

IN ANSWER to the query, the *Mary Jane*, with the 300 hp from Allis-Chalmers diesel engines, was originally named the *Robert E. Lies*. She belongs to the Tennessee Valley Sand & Gravel Company.

QUARTER HORSE is the new name for the long-favorite *Captain Pete*. Owned by Hyer Towing Company, Pensacola, Fla., this boat was re-powered in 1947 with Fairbanks-Morse engines rated at 400 hp.

THE STANDARD Oil (Ohio) Company's towboat, the active and favorite *Sohio State* received special recognition by receiving the highest national safety award for inland waterway petroleum hauling with the record of four years' service with no lost-time accidents. This active 14-year-old towboat is powered by Superior engines for her 1300 hp.

1957 Meeting Dates

The 38th Annual Meeting of Associated Equipment Distributors will be held January 27th-30th, 1957, at the Conrad Hilton Hotel in Chicago. A.E.D. is the national trade association of the construction equipment industry. A.E.D.'s Annual Meeting will be held during the same week as the A.R.B.A. Road Show at Chicago International Amphitheater.

Canadian Contract Awarded

The B.C. Power Commission has awarded a $2,600,000 contract for supply of seven 3,000 kilowatt diesel units for installation at Prince George and Quesnel to Maxwell-Simson & Associates Ltd., Vancouver. The order is for Cooper-Bessemer units—four for a new generating station to serve Prince George, and three for a new plant at Quesnel. The units will operate on natural gas when available in the two interior centers, but can operate on diesel oil as well.

Delivery schedule calls for two units per month in October, November and December this year—one per month for each city. The fourth Prince George unit is scheduled to be delivered in January, 1957. The Prince George plant will replace the existing city-owned diesel generating station. Under a recently-concluded agreement, the Power Commission will take over the Prince George utility this fall. The new 12,000 kilowatt plant will make available about three times the power capacity for the area. It will be capable of expansion to 60,000 kilowatts, equal to 80,000 horsepower.

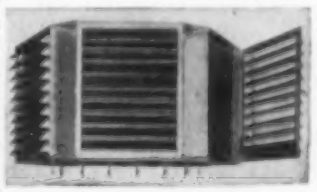
Random Thoughts from a Filter Engineer

by C. W. Savitz

- FILTERING LARGE VOLUMES OF AIR ECONOMICALLY
- HOW STRONG SHOULD FILTER HOUSINGS BE?
- KEEPING OIL IN ITS PLACE

FILTERING LARGE VOLUMES OF AIR ECONOMICALLY

One possible answer to the need for filtering large volumes of air—like in a diesel power plant—is manifolding. Any manufacturer can hook up a group of smaller filters together to achieve almost any desired filter capacity. But there are many valid objections to such a system. First of all, it's expensive. Connecting many small filters together requires a lot of detailed custom work. Then the equipment requires more maintenance—more lines to keep open, more individual units to wash periodically, and more complex trouble-shooting problems. Most important of all, extra duct work makes the unwieldy rig less reliable. Leaks have more places to open up. Finally, manifolded rigs are more difficult to fit into allotted space.



Type DH Filter

The trick as we see it, is to build large filtering capacity into a single unit that is smaller, less complicated, less expensive. Then you'd get cheaper installation costs, your maintenance costs would be lower, reliability better, your space problems wouldn't be as rough—and the filter would probably cost you less to begin with.

If you're considering an installation where large volumes of air are necessary, ask about the Automaze which filters up to 28,000 cfm. It's a single unit and eliminates the problems you run into in manifolding. It embodies the best in impingement type air cleaning with minimum servicing. Another Air-Maze filter, the LPD (Low Pressure Drop), handles up to 24,000 cfm with no moving parts. And for 60,000 cfm, there is the DH series with vibration-proof panels that need no replacement. All single unit jobs.

HOW STRONG SHOULD FILTER HOUSINGS BE?

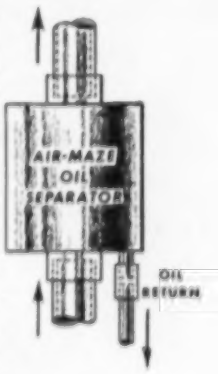
Pipe Line Filter

Most air is filtered somewhere around 14.7 psia—atmospheric pressure, in other words. Under these conditions, the filter housing is strong enough if it can maintain a good seal with the sealing gasket and stand up under any mechanical abuse it may be subjected to.

Yet there are many situations in which it is necessary to filter air under pressure. The discharge side of a blower, for instance, or in a compressor. Here the question of filter housing becomes important in determining the suitability of the filter. Obviously, a filter designed to operate at atmospheric pressure probably won't have the strong housing it needs to withstand pressure of 150 psi or higher. The filter housing must be specially designed for the higher pressure.

In Air-Maze filters designed for high pressure operation, the filter housing is as carefully engineered as the filter itself. To boost the strength of the housing we will use up to ¼" plate or thicker, depending on the pressure. The Pipe Line series (PL) are designed for pressures up to 150 psi and allow for the condensation which takes place under increased pressure. Recently we added a special Closed Circuit Multimaze for pressures up to 600 psi. As is the case with many Air-Maze filters, the Closed Circuit types grew out of the need for new types of filters for modern compressors.

KEEPING OIL IN ITS PLACE



Personally, we don't have anything against oil. Except when it gets in where it doesn't belong. For instance, oil makes trouble when it gets into an air induction system. The crankshaft of a diesel engine disperses crankcase oil into a fine spray. This entrained oil can and does enter the intake side of the turbo charger through the crankcase ventilation system. That makes trouble. When the oil gets on the turbo blades, it can throw the blades out of balance, cause vibration, and generally gum up the works. The efficiency of the engine is cut and maintenance time piles up.

But you can solve this problem by using an oil separator in the crankcase ventilation line to stop the oil before it gets to the turbo charger or air induction system. It pays for itself in reduced maintenance and more efficient operation. The Air-Maze Corporation, 25000 Miles Road, Cleveland 28, Ohio.

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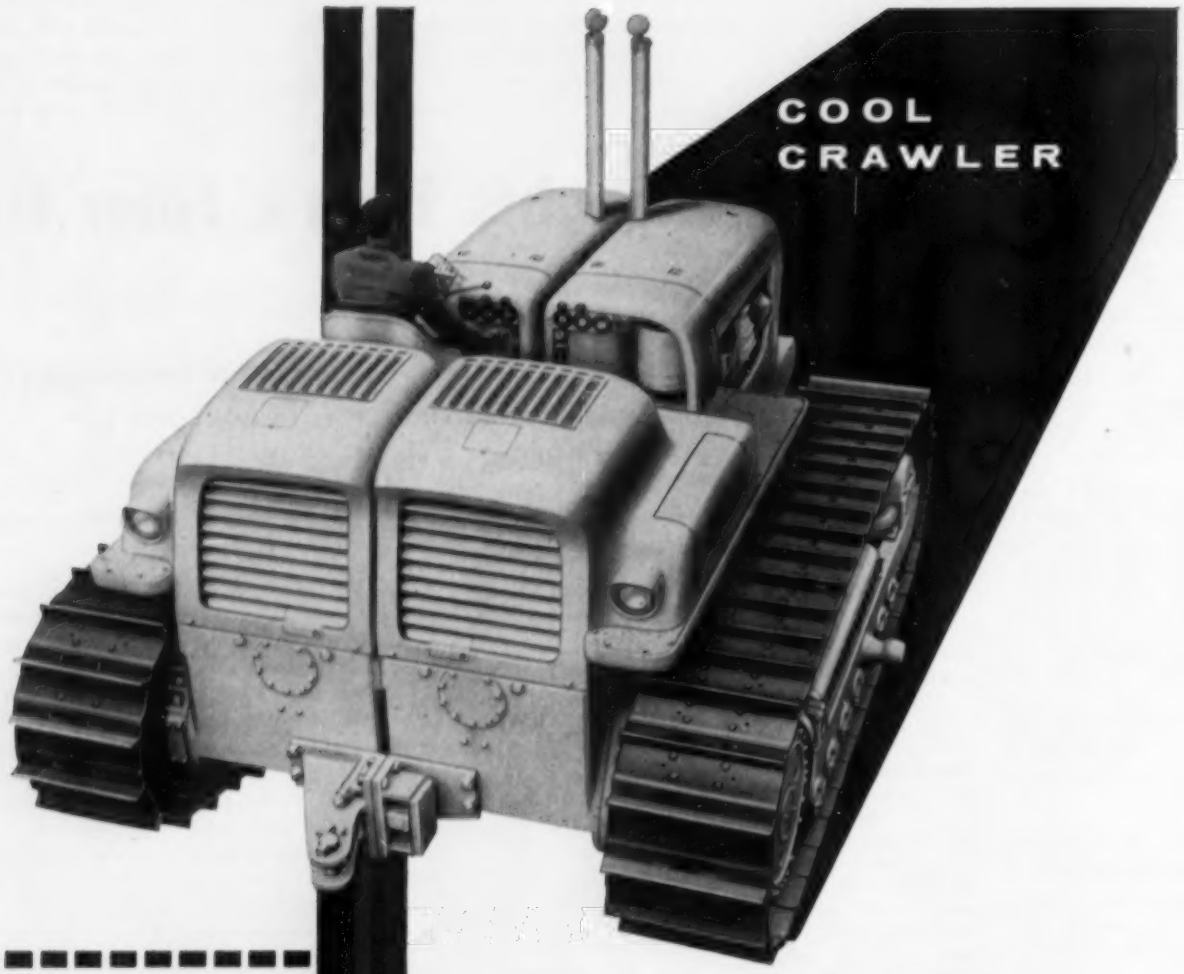

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"EUC" TC-12 Handles Any Job . . .
And Harrison Handles The Heat!

This Twin Crawler takes it cool . : : as Harrison cracks down on the heat! Pulling heavy construction equipment or moving the earth at top speeds . . . Harrison holds the line on heat. That's why Euclid specifies Harrison oil coolers. They know that for the long haul Harrison heavy-duty, high-capacity cooling equipment can't be beat. They know from long experience that Harrison products are engineered and built for dependable, durable, economical service. In fact, Harrison heat control products are backed by more than 45 years of research and manufacturing experience. If you have a cooling problem, look to Harrison for the answer.

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RADIATOR DIVISION, GENERAL MOTORS CORP., LOCKPORT, N.Y.

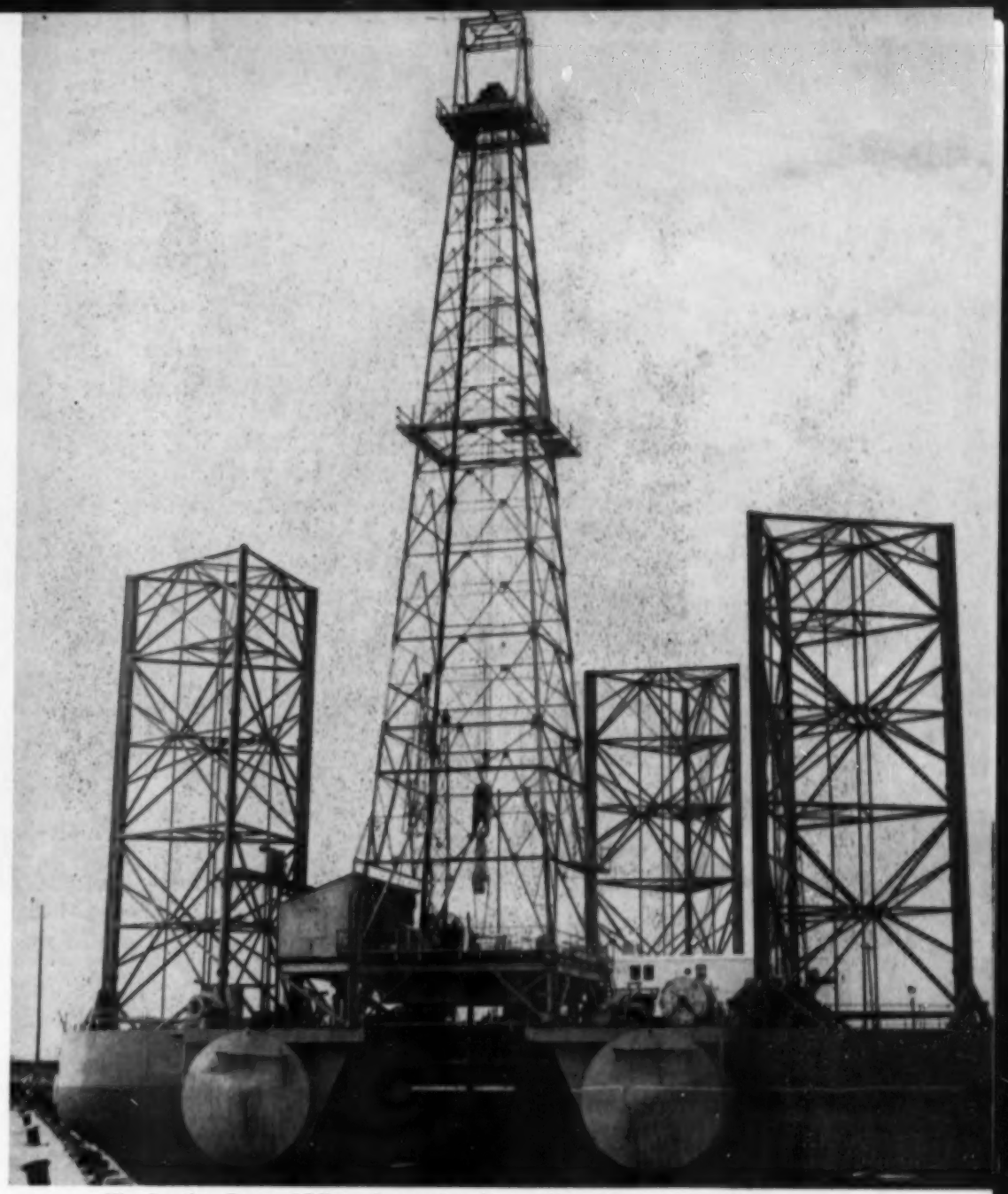
DRILLING PLATFORM "THE SCORPION"

By MICHAEL T. PATE

DRILLING for oil and natural gas beneath the waters of the Gulf of Mexico, where geological studies indicate that probable production will be available all the way out to the Continental Shelf, has pyramided the demands upon the drilling structures and placed an ever increasing premium on reliability of the equipment working there. Latest of the mobile "platforms" developed to carry a drilling derrick and appurtenant machinery, and to be suited for drilling in as much as 100 feet of open water is *The Scorpion*, a three-legged contrivance—neither "craft" nor "platform" adequately describes its multiple functions—which can draw its legs within itself and be floated to location, and there positioned to withstand the stresses of drilling a well to some 15,000 feet.

The Scorpion falls within the marine limitations of a "barge," being without propelling machinery, but it is far from the conventional barge in appearance or design. The hull consists of three large tubes, two parallel to form port and starboard sides of the barge, with a third welded across the after end. These three tubes are joined by a center section with a corrugated bottom. Tubes and center section are divided into compartments by bulkheads, decks and water-tight doors. All joints and junctions are electric-welded. Outboard on the two sides and the after end are three spud wells, within which three electro-mechanically operated spuds or legs are adjusted to conform with the contour of the Gulf floor. When the spuds are positioned, continued operation of the lifting mechanism elevates the working platform to any required height above the surface of the water—usually about 40 feet in open Gulf to allow waves to pass beneath the hull without contacting it. The spuds are triangular in cross-section, welded from tubular members for utmost in strength and rigidity without offering surfaces large enough to oppose waves or current through them. A pontoon tank forms the lower end of each spud, the base being convex to assist in guiding the spud to a firm footing on bottom.

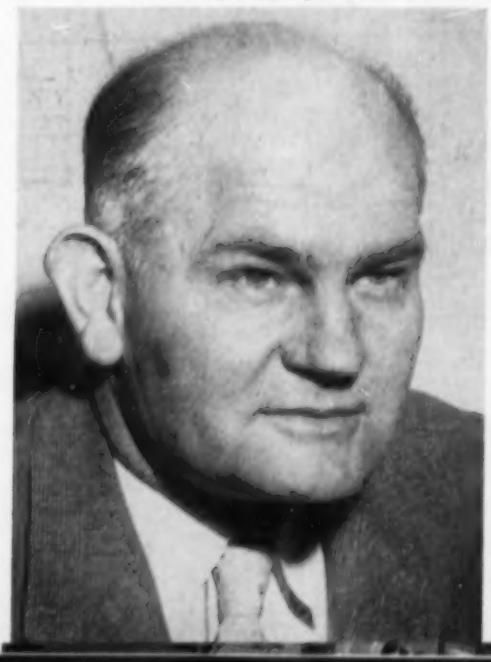
The outer corners of the triangular legs are equipped with racks, welded the entire length of the spud and out onto the pontoon base. Final drive pinions mesh with these gear racks to move the spud vertically wtihin its well. The leg movement is controlled by LeTourneau electric gearmotors, 21 of them in each leg housing. All motors have integral motor-load brakes that set mechani-

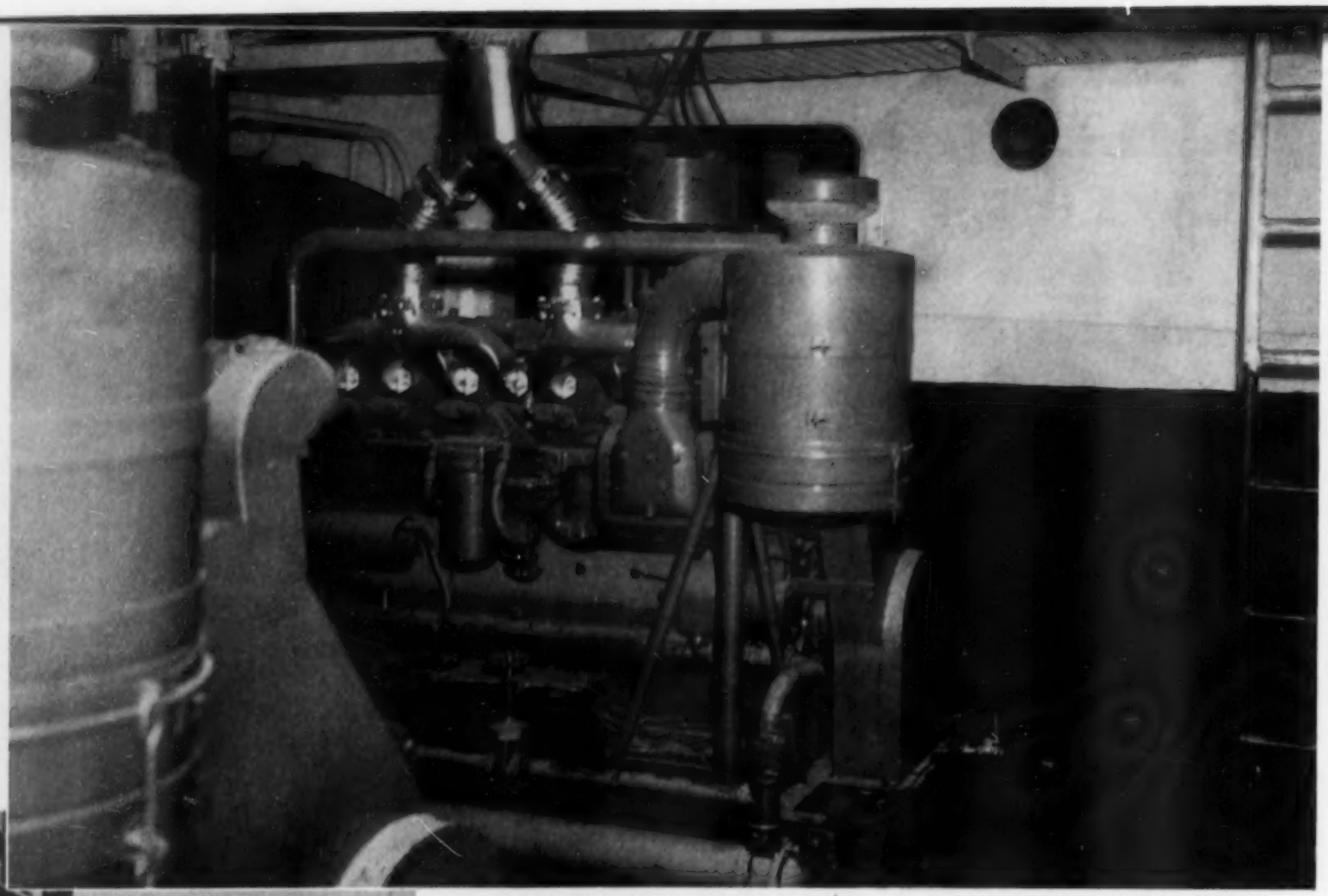


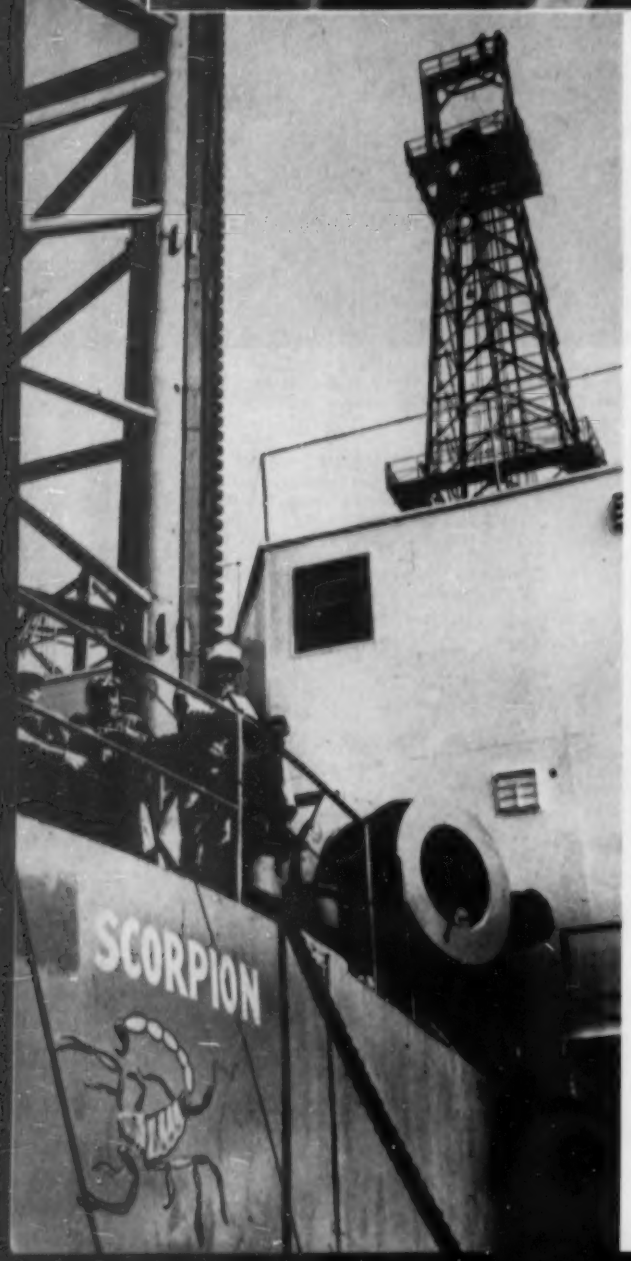
The *Scorpion*, Zapata Off-Shore Company's unique mobile offshore drilling platform, which has attracted widespread interest throughout the petroleum industry, stands at the piers at Galveston, almost ready to join the search for oil beneath the Gulf of Mexico. It was designed and built by R. G. LeTourneau, Inc.

George H. W. Bush, president of Zapata Off-Shore Company. He is also one of the founders and a vice president of Zapata Petroleum Co. as well as an officer of Zapata Drilling Company.

Wayne H. Dean, vice president-manager of Operations. Mr. Dean boasts a 30-year history in the oil business, having started as a roughneck in 1926. He has directed drilling operations for California Company and Kerr-McGee before joining Zapata.







The "bow" of the craft with one of the forward spud showing the rack teeth for elevating the craft. The 140-ft. derrick towers over the 2-story deckhouse.

One of the four Allis-Chalmers diesels with the specially designed generators which furnish power for the 63 motors in the spud operating housings. The Vortex air cleaner on the adjacent diesel cuts off view of radiator and generator drive coupling.

cally when electric power is off, and release electrically when power is applied. Each of these gearmotors is readily accessible from the working deck through water-tight hatches. Length of the spud wells is such that the spud is maintained at right angles to the working deck regardless of the length of spud beneath the hull; while separate controls provide for manipulation of any one spud or any desired combination of any two or all three, so that the deck may be maintained level regardless of irregularities in the bottom contacted by the three pontoon "feet" of the legs.

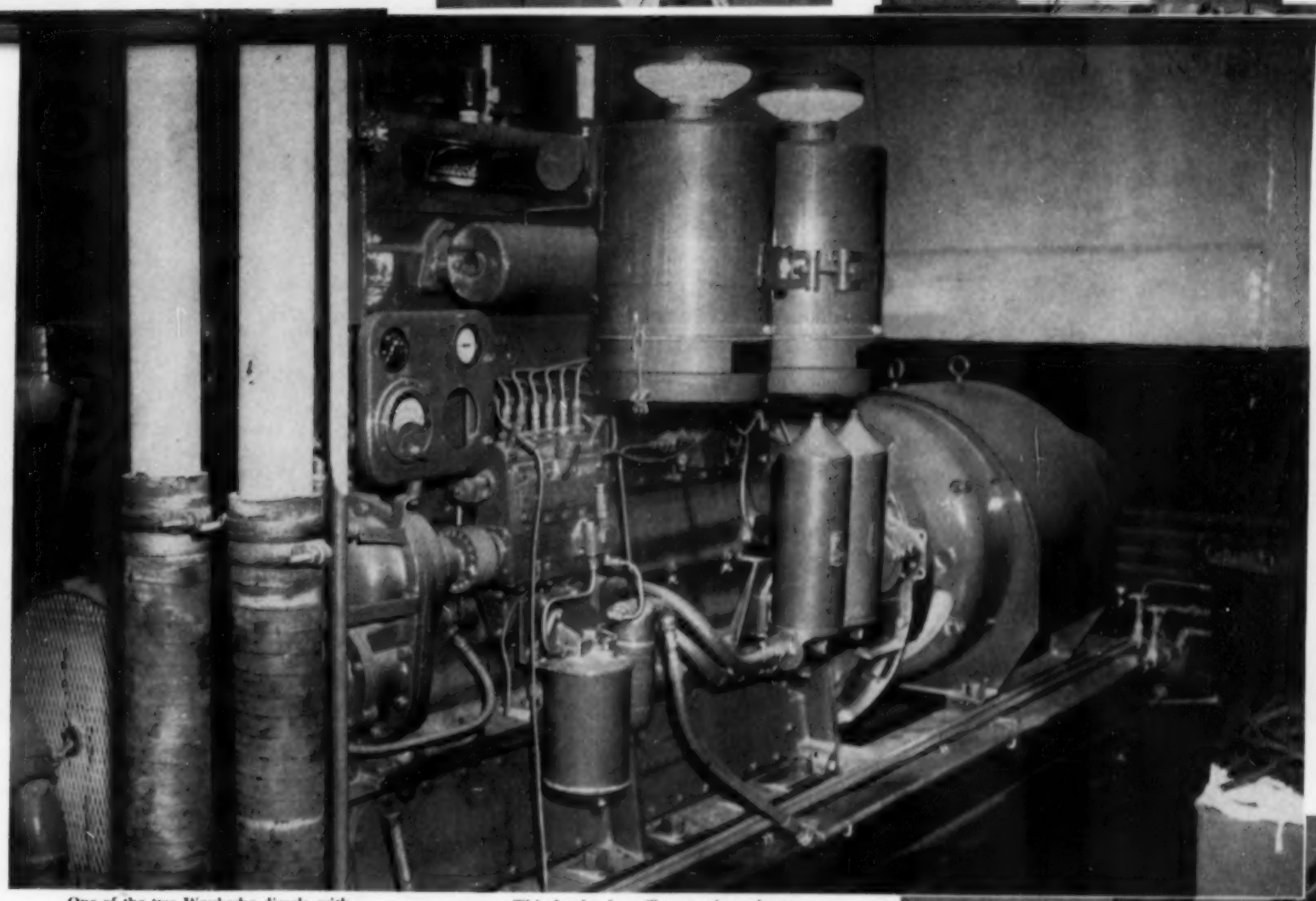
The barge is equipped with an operator's control station on the main deck from which manipulation of the spuds and platform elevation are governed. Two of the spuds, those carrying the bulk of the load of derrick and drill pipe, are in plain sight in front of the operator at lifting time, with the third visible except when operating in deep water, at which time an indicator from inclination of the deck provides advice as to its required movement.

Power for all of the *Scorpion's* many functions is provided by diesel engines, fuel for which is stored in compartments within one of the tubular main members of the hull. Four Allis-Chalmers Buda diesels, model 8DAS-1125, direct-connected to LeTourneau ac generators furnish the power for the spud-elevating motors as well as powering the motors of two LeTourneau 250 foot-ton electric revolving cranes and the three LeTourneau electric winches, each designed for 50,000-pound line pull.

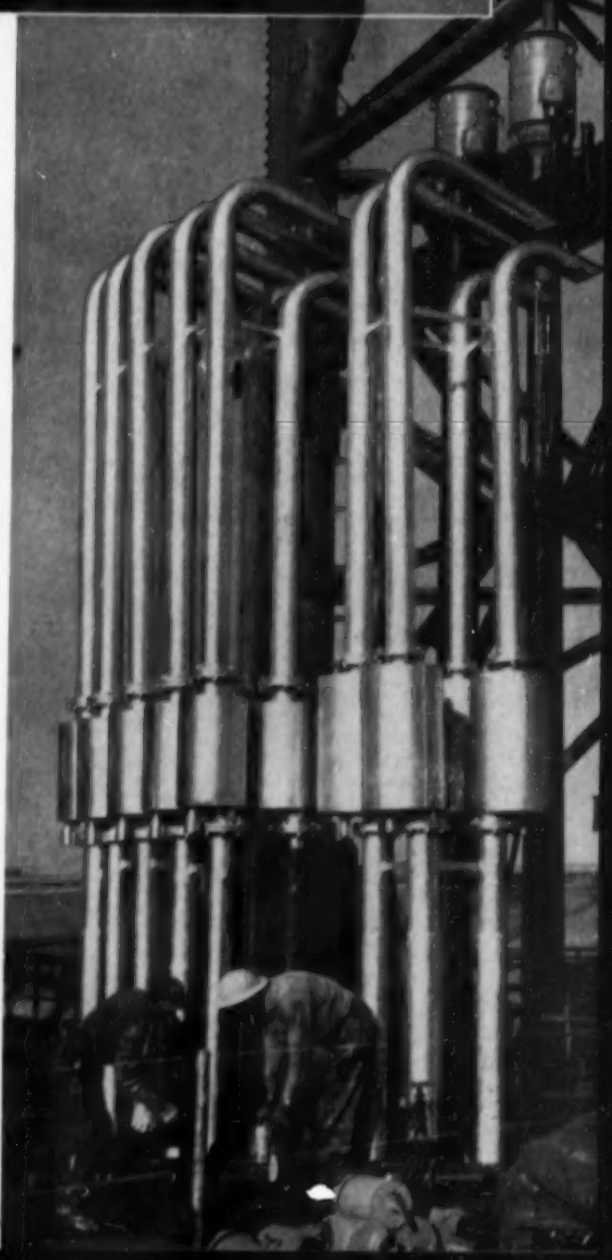
These winches manipulate the three anchors used to position the hull at the drilling site, and pull them up against the hull once the legs have been set on bottom and the hull raised above the water.

The drilling equipment is powered by four General Motors model 122403, series 110, 6-cylinder twin diesels, each equipped with torque converter units. The diesel twin units are each rated 400 hp continuous duty, the General Motors model 850 torque converters being of the dumping type. Drive to the compounding unit is through 28-inch Fawick

Looking across the main engine deck, with three of the General Motors twin-6-110 diesels ranged across the farthest



One of the two Waukesha diesels, with Vortox air cleaner of the engine appearing in the center. These furnish all auxiliary power for the 60-cycle, 220-volt and 440-volt galley and crew quarters equipment. Alnor pyrometer is mounted on the board.

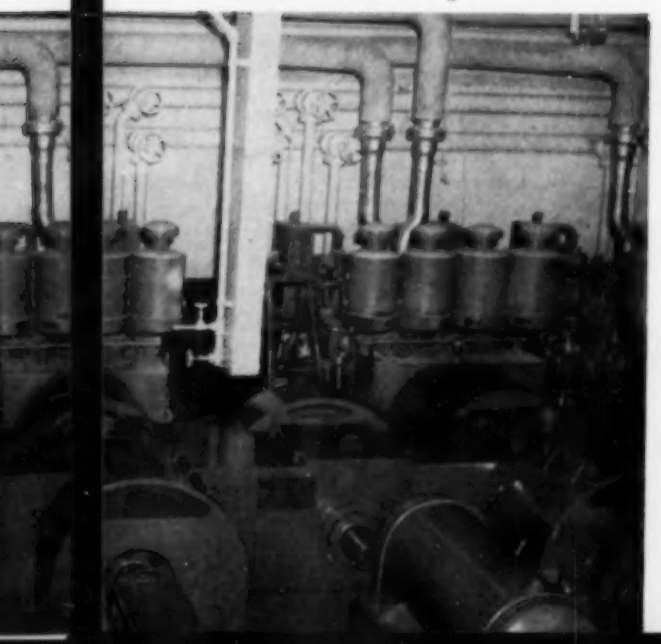


This bank of mufflers carries exhaust from, at the left, the four General Motors diesels; center, four Allis-Chalmers; and at right, the two Waukesha diesels. A detail of the intricate bracing of the spud or leg is visible to right of the mufflers and exhaust pipes. The two pumps above the muffler discharge leads provide sea water for the jacket water heat exchangers.

clutches. A fifth General Motors model 122403 diesel is mounted at the catworks side of the drilling floor, and through a torque converter drives the coring reel with capacity for 15,000 feet of coring line. Three similar General Motors diesels, located in the starboard tube of the hull, power the pumps use for cementing operations, their exhausts being carried up through both decks of the personnel house and out through the roof.

Two Waukesha diesels, model 6NKDBS, are direct-connected to as many Electric Machinery 200 kw ac

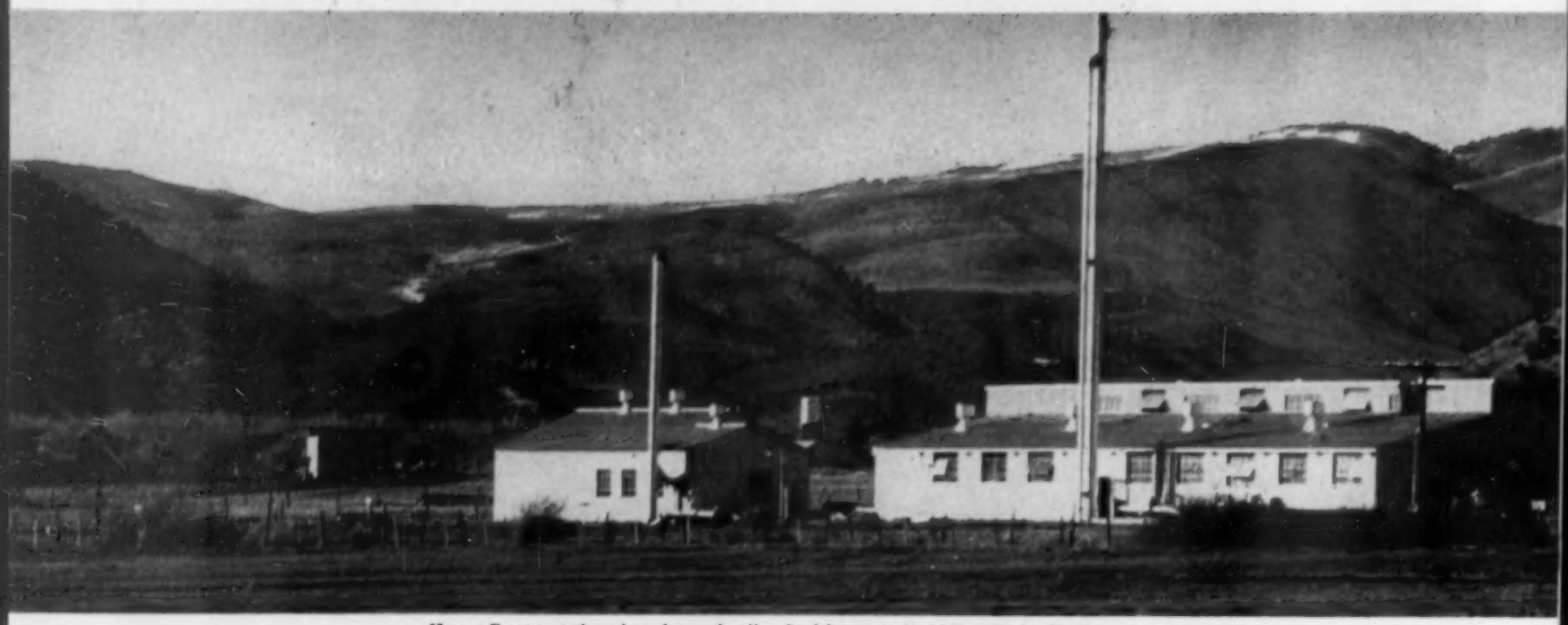
bulkhead. All exhaust piping is carried along the bulkhead to a common muffler setting.



440/220 volt 1200 rpm generators. These furnish power for lighting, cooking, hot water for bathing purposes, and the cold storage compartments. All galley ranges are electric, as are all auxiliary equipment for the comfort of the crew. The General Motors diesels were furnished by Stewart & Stevenson Services, Inc., of Houston; the Allis-Chalmers Budas by Buda Engine & Equipment Co., Inc., of Houston and the Waukeshas by Reagan Equipment Company, New Orleans. The barge was designed and built by R. G. LeTourneau, Inc., of Longview, Texas, at Vicksburg, Mississippi, and launched there for its first journey down the Mississippi and around through Gulf waters to Galveston, Texas, for outfitting.

The barge has a 4,000-ton displacement when fully equipped for drilling, with a draft of approximately 11½ feet. The barge can be towed in moderate seas. Principal dimensions are: Hull length, 150 feet; Length, including end spud housing, 185 feet; Width of hull (beam, on any other craft) 80 feet; Width, including side spud housing, 150 feet; Depth of hull, 20 feet; maximum height, platform deck to pontoon bottom with spuds fully extended, 140 feet; dead weight, 2,000 tons.

The *Scorpion* was built for and is being operated in the open Gulf by Zapata Off-Shore Company, whose engineering department worked closely with LeTourneau Company's engineers in the design and construction of the unit.



Hanna Booster station gives the crude oil a final boost to the high point in the line, a summit 9560 feet above sea level, where gravity flow to the refinery begins.

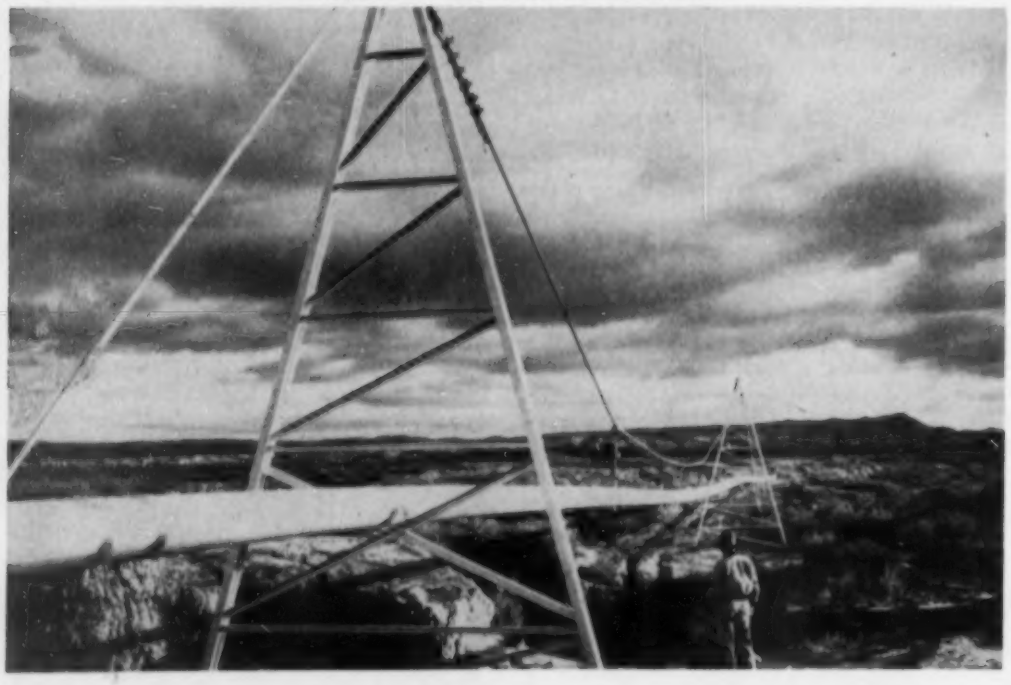
HIGH COUNTRY PIPE LINE

Nordberg Diesels Provide Power for 182 Mile Pipeline in Mountainous Country

OIL is where you find it and getting crude oil to a refinery can be a rugged job. An outstanding example is the 182 mile pipeline built by Salt Lake Pipe Line Company in the mountainous country of the western United States. Oil was discovered near Rangely, Colorado by The California Company, a subsidiary of Standard Oil Company of California, and further development was carried out by the Salt Lake Pipe Line Company. Rangely is located on a plateau in northwestern Colorado, over one hundred miles from any large industrial city. Construction of a crude oil line was the only suitable method of getting the oil to a refinery.

Rangely is at an elevation of 5175 ft. and before reaching the refinery at Salt Lake City, a summit of 9560 feet had to be scaled. The terrain along the route included rocky plains, steep gullies and ravines, streams and rivers and wooded mountains. To add to the problem, time for construction was limited to a few summer months between the melting of the snow in the mountains and the arrival of new snow in the fall.

Triangular shaped towers support the 10-inch steel pipeline as it begins its climb from the rocky plateau of the Rangely oil field in Colorado.



Building a pipe line is something like building a highway—the job does not stay put, but keeps moving to a new location each day. The big difference is that pipe lines are built right up and over mountains and through the beds of streams instead of cutting through, going around or bridging as is the case with highway construction. Such was the construction of the Salt Lake pipeline. Construction of a 10-in. steel line was begun in the spring of 1948 and three strategic locations along the 182 mile route were picked for the pumping stations. Powerful engines were installed to give the crude oil the necessary boost to reach the high point in the line. From here the law of gravity takes over.

Each of the three pumping stations are equipped with six Nordberg four cycle, in-line engines. Four eight-cylinder Nordberg engines, each rated 442 hp at altitude, drive the pipeline pumps and two four-cylinder Nordberg engines are direct connected to 75 kw dc generators to provide electric power for the relatively remote stations. The first station was built at Rangely. Five Nordberg duafuel engines were installed during the summer of 1948 and another was added during the summer of 1949. The second station is located approximately seventy miles to the west on a mesa near Myton, Utah. This station is at an elevation of 6690 feet and is not far from U.S. Highway 40. All six Nordberg engines were installed here during the summer of 1949.

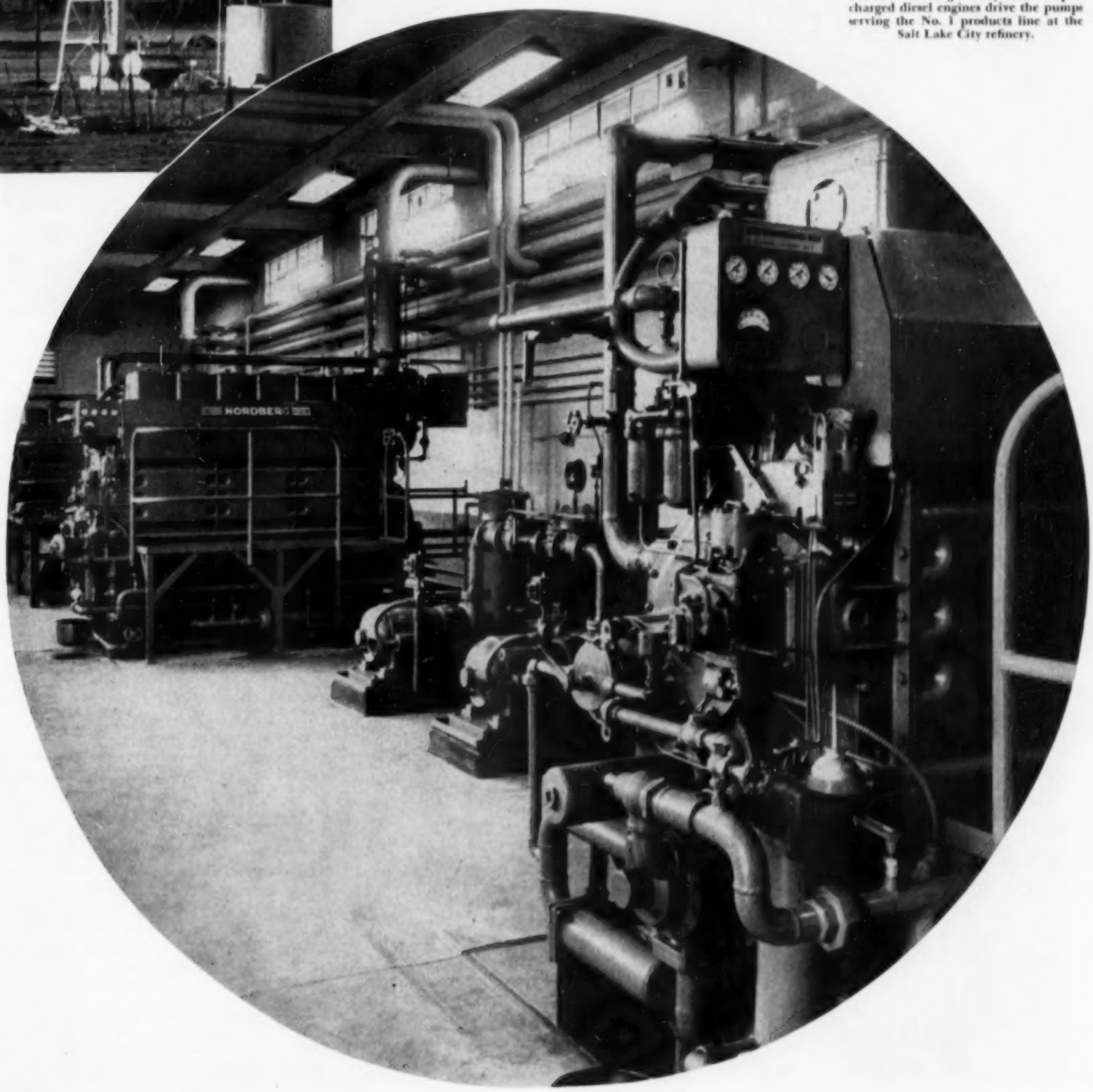
Forty miles to the northwest is the last pumping

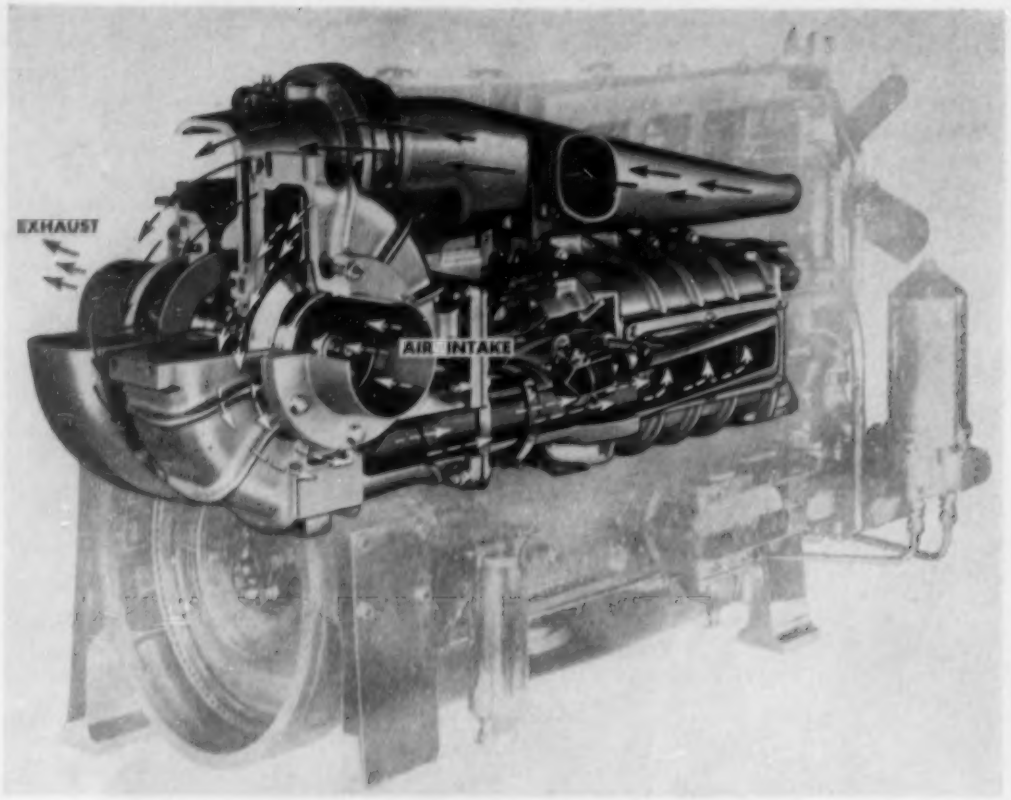
station, also at a 6690 foot elevation. Hanna Booster station's Nordberg diesel engines were all installed in 1948 and they give the oil its final boost —a 15 mile push to the top of Wolf Creek Pass, the high point of the line. The oil flows by gravity the remaining 45 miles to the refinery at Salt Lake City, which has an elevation of 4300 feet. At the Salt Lake refinery, an additional five Nordberg pumping engines are in service. Three six-cylinder diesel pumping engines, each rated 310 hp at 535 rpm, were installed in 1949 and three years later two eight-cylinder pumping engines were added. These engines serve the refined product pipelines leaving the refinery for market areas farther west.

While the majority of the 23 Nordberg pumping engines operate on Rangely crude oil, engines of the Duafuel type are installed at the Rangely pumping station so use can also be made of the gas available from the wells.

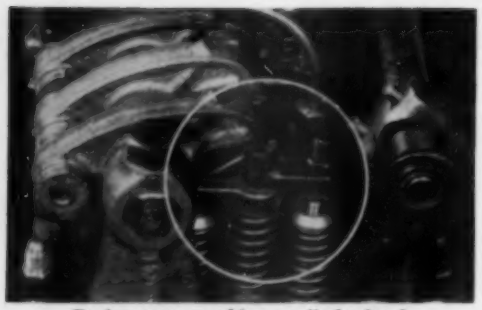
In this country where movement by men or machines is so difficult throughout most of the year, all equipment receives a stern test of reliability. The success of this high country pipeline which spans some of the most rugged terrain in the United States is evidence of this dependable performance and a real tribute to the men who built and operate the pipeline.

Three Nordberg six-cylinder supercharged diesel engines drive the pumps serving the No. 1 products line at the Salt Lake City refinery.



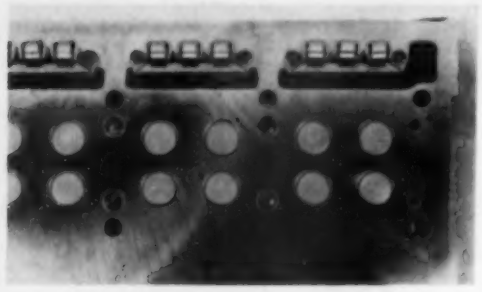


Cutaway view of the Detroit Diesel Turbopower engine showing path of exhaust gases through exhaust-driven turbine and resulting flow of fresh air from turbine-driven air impeller to the Roots blower.



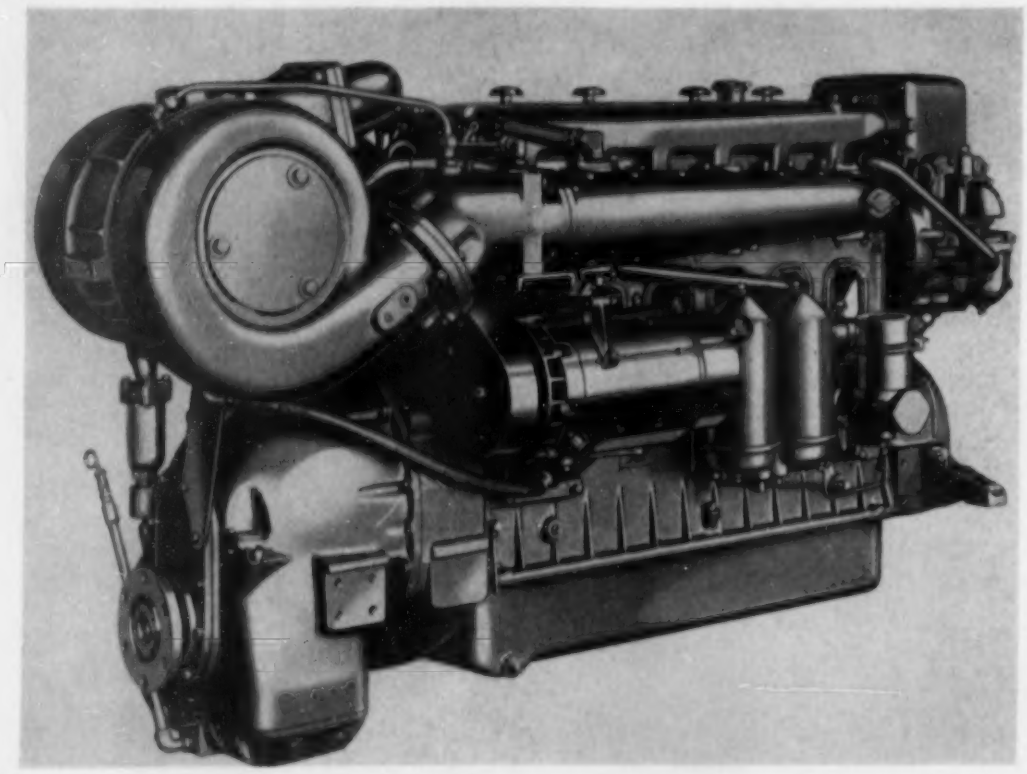
Rocker arm assembly on cylinder head of Turbopower engines which activates the four exhaust valves and the injector. End rocker arms each activate two valves by means of a bridge assembly (in circle) which connects to each valve. Center rocker arm operates the injector.

A section of the cylinder head fire deck showing the four exhaust valves per cylinder. Also shown are the directional water nozzles, the rollers on the bottom of the cam followers and in the center of each set of valves the injector tip opening.



DETROIT DIESEL TURBOPOWER ENGINES

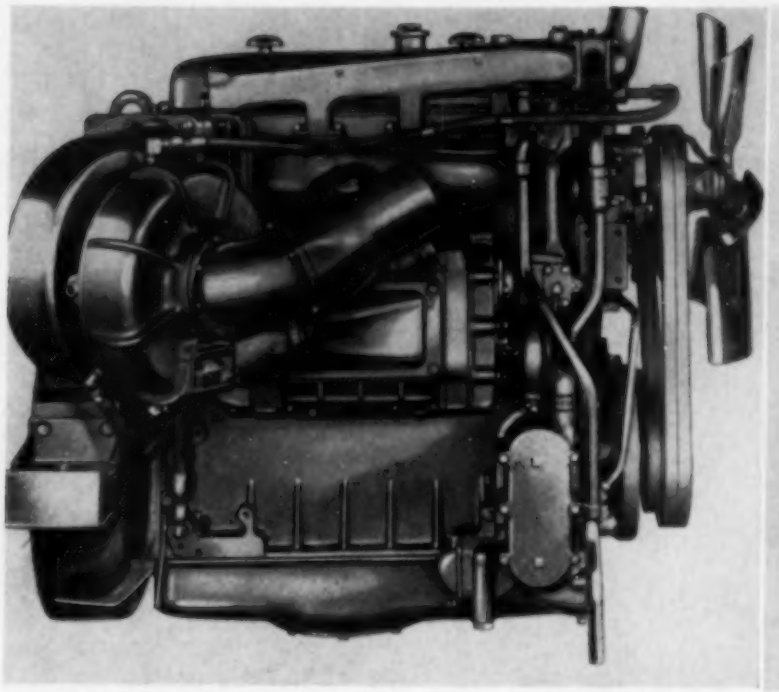
Detroit Diesel 280 hp Turbopower marine unit. Models are available in right- or left-hand rotation units with either iron or aluminum block.



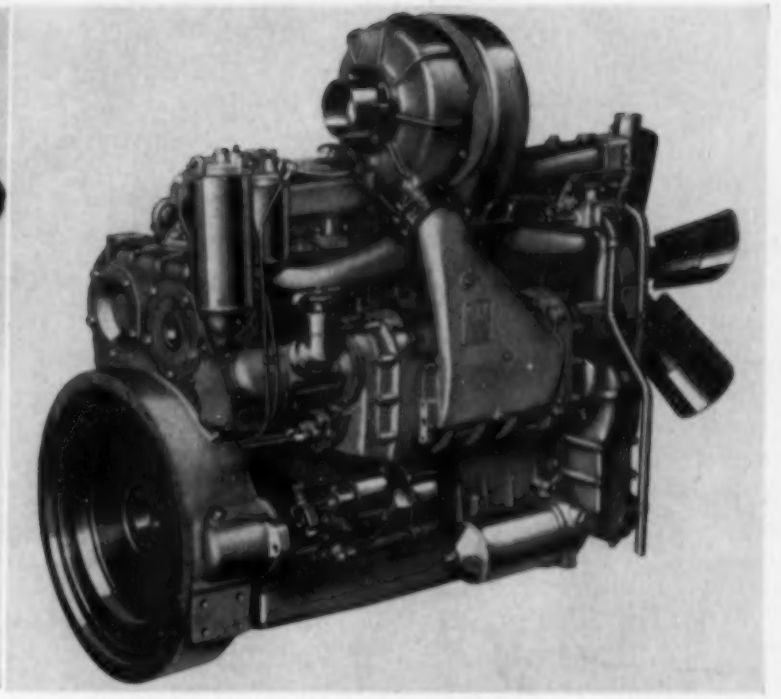
DETROIT Diesel Turbopower engines are presently offered in a four-cylinder model for industrial use and in four six-cylinder models for both industrial and marine applications. These engines are basic Series 71 units retaining General Motors' two-cycle design, the unit injector fuel system, uniflow blower scavenging and other Series 71 features. A single-shaft, exhaust-driven centrifugal turbine added to the already highly efficient Series 71 engine has produced a diesel of even greater economy with an outstanding power-to-weight ratio.

The exhaust turbine teams up with the standard Roots blower to increase the scavenging air supply and the pressure at which the air is delivered to the air box. The turbine utilizes the "free push" of expanding exhaust gases rather than any power developed by the engine itself. The use of the turbine together with other design changes results in better air-to-fuel ratios, which in turn contribute to improved combustion and better all-around efficiency at all engine loads. The improved performance of Turbopower engines is achieved with no increase in fuel input and with no increase in weight-to-horsepower ratios.

The turbine also contributes to the over-all efficiency of the engine in another way. Working in conjunction with the engine-driven blower, the turbine lightens the blower load and permits a reduc-



The Detroit Diesel four-cylinder Turbopower unit for industrial use is rated at 171 basic horsepower. The unit may also be used as a replacement engine for on and off the highway trucks.



Detroit Diesel 236 hp fan-to-flywheel Turbopower engine for industrial use.

tion in blower speed. The resultant saving in horsepower is released for use at the shaft. The air-intake ports of Turbopower engines are of increased size and extend to a higher level on the cylinder liner. These changes take care of the increased air supply by permitting a larger charge of air to enter the cylinders and also by allowing the ports to remain open for longer air-intake periods.

A fast and complete elimination of exhaust gases in Turbopower engines has been attained by increasing the number of exhaust valves in each cylinder from two to four. The valves are activated by rocker arms on the head as in Series 71 engines but each rocker arm activates two valves. This is accomplished by means of a bridge piloted on a shaft which is screwed into a tapped hole in the cylinder head. The bridge is adjusted to contact each valve equally and the valve lash adjustment is accomplished as in non-turbopowered Series 71 engines.

The four-cylinder model is a fan-to-flywheel engine for industrial use. It has a rating of 171 basic horsepower at 2300 rpm. Its compact size and higher horsepower rating also make it ideal for use as a replacement engine for on and off-highway trucks.

The six-cylinder model is available for industrial use as a fan-to-flywheel engine and also as a base-mounted power unit. It is rated at 236 basic horsepower at 2100 rpm. For marine use Turbopower units are available in two six-cylinder models. They are offered with cast iron or aluminum blocks in either right or left hand rotation. These engines are rated at 280 basic horsepower at 2500 rpm.

The Turbopower units are highly efficient additions to the Detroit Diesel line providing a wider horsepower range. They do not replace any existing Detroit Diesel models.

VEHICULAR, PORTABLE AND STATIONARY POWER PLANTS

Model	Cont. HP 1800 RPM	Rated HP 2000 RPM	No. of Cyl.	Bore & Stroke	Fuel System
4-71	93	127	4	4¼x5	Injector
4-71T*	114	147	4	4¼x5	Injector
6-71	142	195	6	4¼x5	Injector
6-71T*	172	218	6	4¼x5	Injector

Model	Weight	Starting	Length	Width	Height
4-71	1750	Elect.	48	30	47
4-71T*	1760	Elect.	44	45	38½
6-71	2135	Elect.	59	30	49
6-71T*	2255	Elect.	55½	33	47

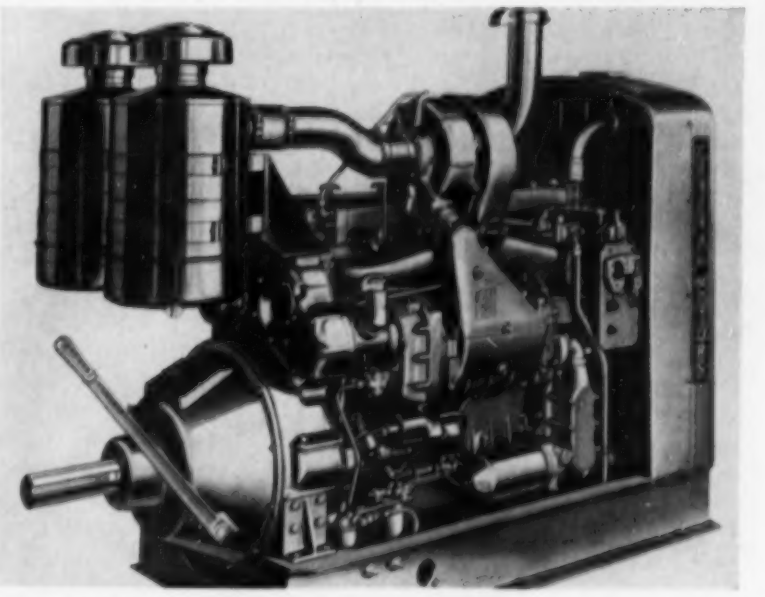
MARINE PROPULSION UNITS

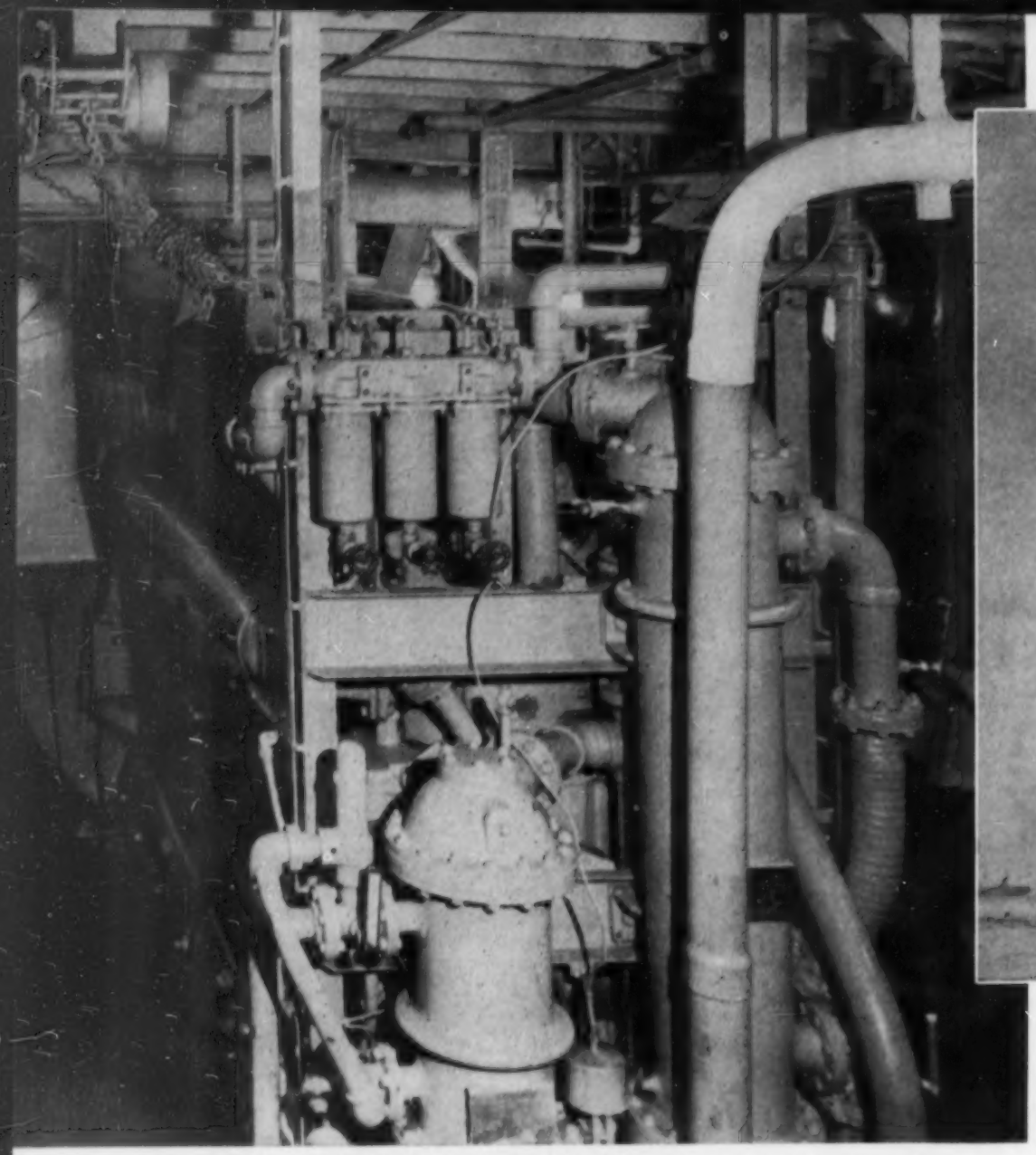
Model	Pleasure Craft Rated S.H.P. 2300 RPM	Work Boats Cont. S.H.P. 1800 RPM	No. of Cyl.	Bore & Stroke	Fuel System
6-71	235	147	6	4¼x5	Injector
6-71T*	271	173	6	4¼x5	Injector

Model	Complete Unit Weight	Starting	Length	Width	Height
6-71	2740	Elect.	68	33	40
6-71T*	3025**	Elect.	84	34	43

*Turbopower.
**Aluminum Block 2555 lbs.

The 6-71 base-mounted Turbopower unit has a basic rating of 236 hp at 2100 rpm.





One of the 900 hp Alco diesel engines in the *Cavalier's* engine room. It develops its rated horsepower at 700 rpm.

The highly maneuverable diesel tug *Cavalier* is shown nosing the giant USS *Forrestal* into midstream.

A DIESEL

AN order for two new Alco marine diesel engines has been announced by Curtis Bay Towing Company of Norfolk. To be placed in two new tug boats which Equitable Equipment Company is building for the towing firm, the main propulsion equipment was ordered as a direct result of Curtis Bay's experience with Alco engines in their tug, the *Cavalier*. The dieselized *Cavalier*, newest of Curtis Bay's fleet of modern tugs, is fast, powerful, and an exception to normal upgrading practice. She's a new hull for existing machinery. "Usually the machinery wears out first," explains Donald Jefferson, shipyard supervisor at Curtis Bay. "But this time we had a hull that was fast going bad, while a great deal of its equipment was still serviceable."

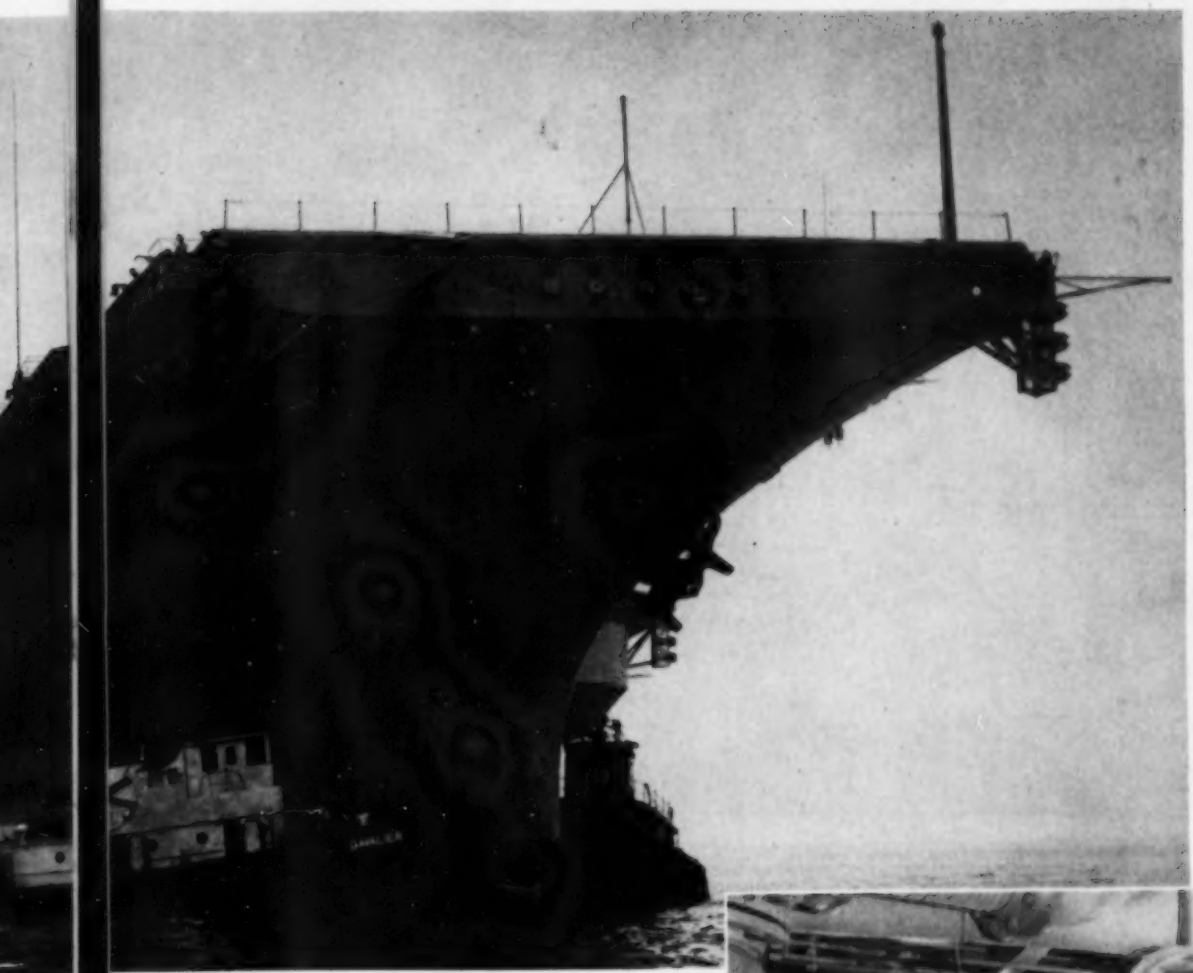
The two engines on order are Alco's new Model 251, 16-cylinder diesels, rated at 2100 brake hp. They will drive through a Hindmarch-DeLaval reverse reduction gear. While the hulls for the two new tugs, which are similar to the *Cavalier's* in design, will be built at New Orleans, Curtis Bay will outfit them at Norfolk. The engines will be delivered to Norfolk in June and will be the first tug boat applications for Alco's new model diesel.

The *Cavalier* is equipped with two Alco 900-hp diesel engines which had been installed in a Navy net tender, then later purchased by Curtis Bay for use in their tug, the *Peerless*. Their excellent maintenance record here weighed heavily in the decision to make further use of the veteran diesels. Between conversions, only the main journals were renewed—and wear was not excessive at that. Although four years had elapsed since the engines were last overhauled, they were still going strong. And in the twelve years since they had been built, not one major breakdown had been reported.

Now in their third conversion, the twin diesels have taken their place in the new *Cavalier*, most powerful tug in the Curtis Bay fleet and "probably the best tug on the Atlantic Coast," according to one company official. The ship's all-welded hull is a slight modification of the standard 105-foot Equity design, with lines similar to those of a racing craft—for maximum speed and maneuverability. Beam is 27 feet, molded depth nearly 14 ft. 8 in. and full-load draft 12 ft. 10 in. Its heavy-duty construction permits the tug to be used for coastwise towing, ocean service, or harbor use.

A well-planned engine room provides ample working area around the propulsion and auxiliary machinery. Both of the Alco diesels are Model 539, 6 cylinders, 12½-inch bore, 13-inch stroke. Their 900-hp rating is established at 700 rpm. Cooling is provided by a Type 1-21-81-V Alco cooler which is mounted on each engine, while starting air for the engines is supplied by a pair of two-stage air compressors delivering 660 psi to supply tanks and starting receivers. The diesels drive two 620-kw General Electric generators. These in turn drive a 1500-hp General Electric double armature propulsion motor. Auxiliary power is supplied by two 60 kw stand-by Allis-Chalmers, Buda Division diesels and generators. An exhaust blower with a capacity of 14,500 cfm provides ventilation to the main motor. Two smaller fans insure a supply of fresh air in the engine room at all times.

Other auxiliary equipment includes 30,000 gal. storage tanks for fuel, water tanks, pressure tanks, and pumps for fuel-oil and lubrication oil transfer, and are housed either in engine room or adjacent machinery compartment. Above-deck facilities and equipment on the *Cavalier* also leave little to be desired. The pilot house, for example, is instru-



The well planned layout of the *Cavalier* provides ample working area around main diesels, generators and main motor.

"CAVALIER"

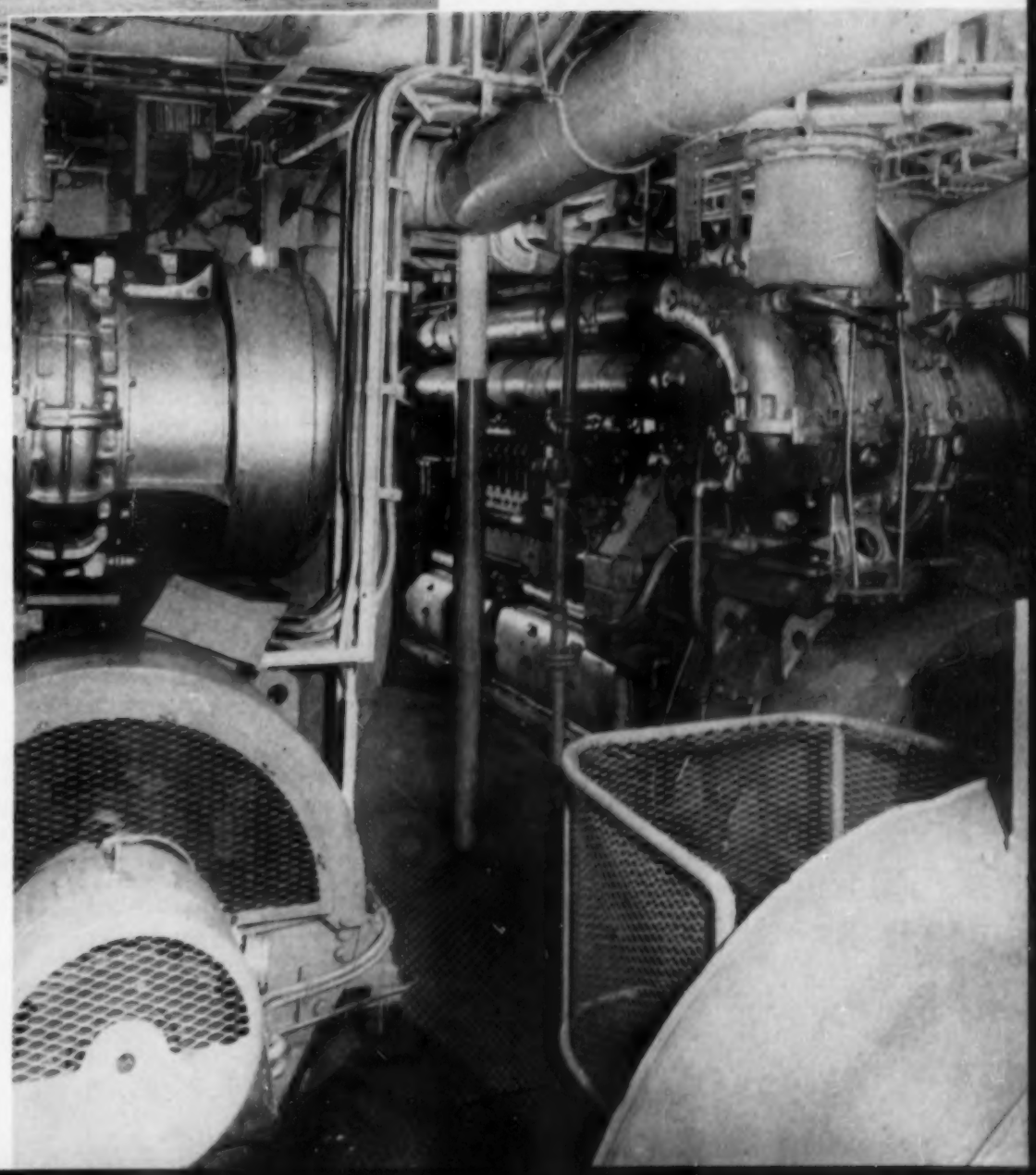
mented to permit all types of operation—regardless of weather or location. Navigation and communication facilities include RCA radar, Loran, ship-to-ship and ship-to-shore radio telephone, and Kelvin-White magnetic compass. There is also an RCA F-M direct radio phone to the office for dispatching purposes.

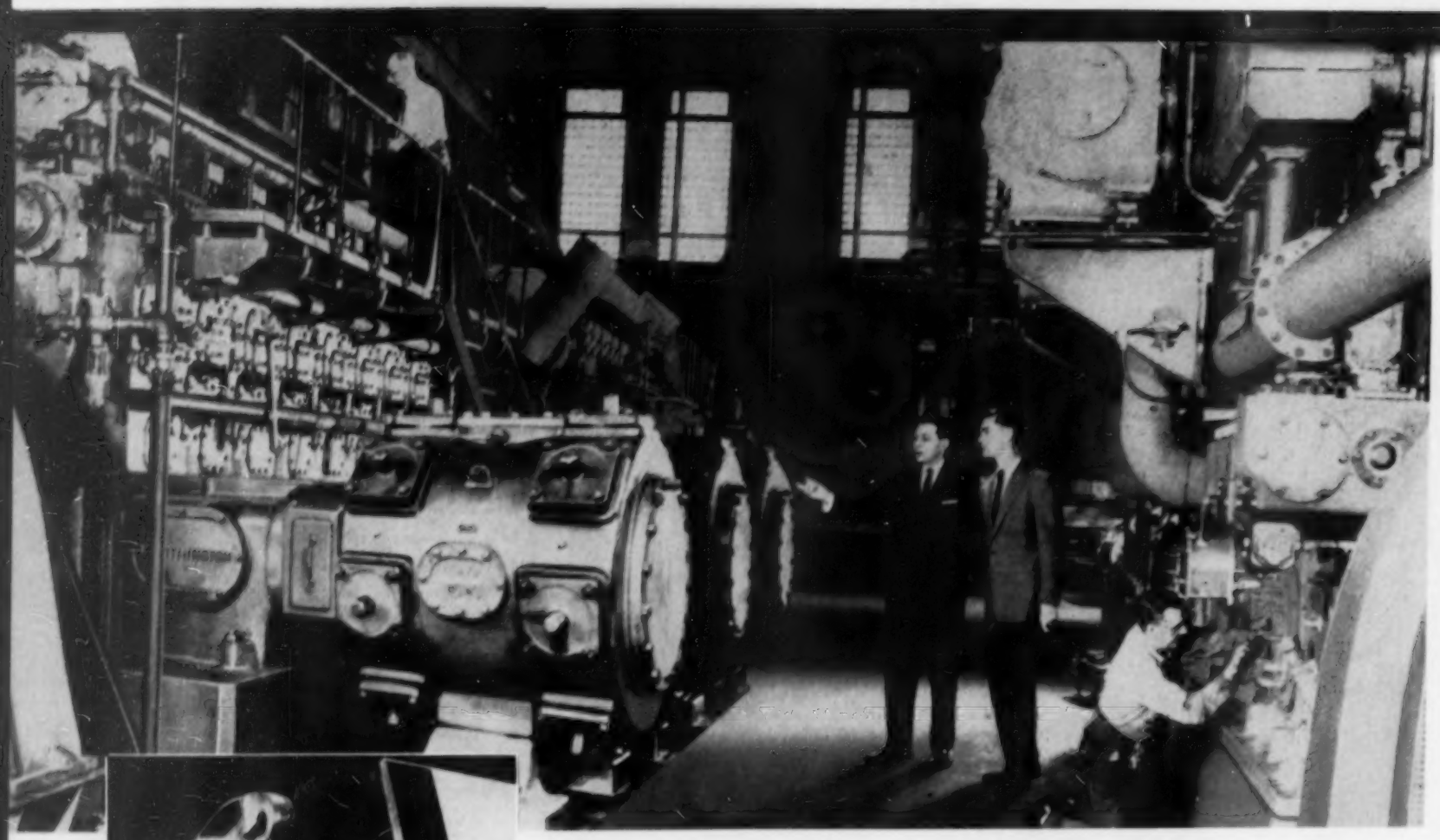
A remote control for Montgomery Elevator Co. electrical steerage system permits full operation of the tug from either the port or starboard side of the wheel house. A rudder-angle indicator is installed on the steering stand, with the motor for the steerage assembly housed in the engine room. A crew of ten can be accommodated comfortably. Sleeping quarters are provided in the forward part of the hull, with the captain's and engineer's quarters on the main deck. A combination galley-mess hall is located in the deck house, and equipped with Webbperfection oil-fired range.

The *Cavalier* is now seeing plenty of service in and around her home port of Norfolk, Virginia. Already she's proved to be an excellent tug for docking and undocking operations, and coastwise towing. In addition, Curtis Bay plans to use the vessel for salvage operations and ocean rescue as needed. The two new tugs will likewise be placed in similar service.

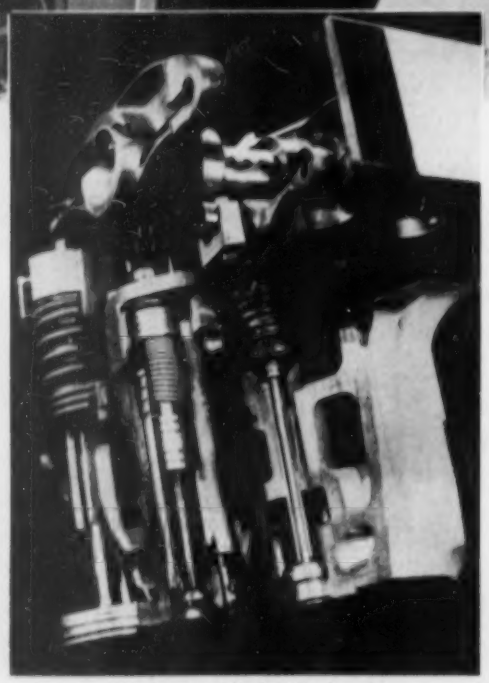
List of Equipment

Main engines—Two Alco Model 539, 900 hp at 700 rpm, 6-cyl., 12½-in. by 13-in.
Supercharger—Alco.
Governor—Woodward.
Generator—General Electric.
Exciter—General Electric.
Standby diesel generator sets—Allis-Chalmers, Buda Div., 60 kw, 115 v, dc.
Fuel oil filter—Commercial.
Lube oil filters—Briggs.
Lube oil strainer—Purolator.
Lube oil cooler—Alco.
Exhaust pyrometer—Brown.
Jacket water pump—Gould.
Fuel injection—Adeco.
Fuel booster pump—Tuthill.
Temperature regulator—Fulton Sylphon.



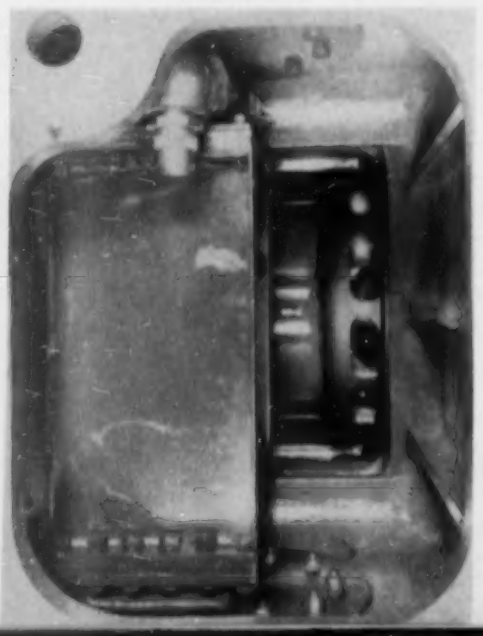


View of the Turbo-Uniflo, Worthington's SUTC Gas Engine Compressor. Right: Engine reveals side of SUTC with the turbocharger. Left: Engine shows the compressor side of the SUTC with compressor cylinders.



Power Cylinder Head.

Air Aftercooler.



GAS ENGINE COMPRESSOR

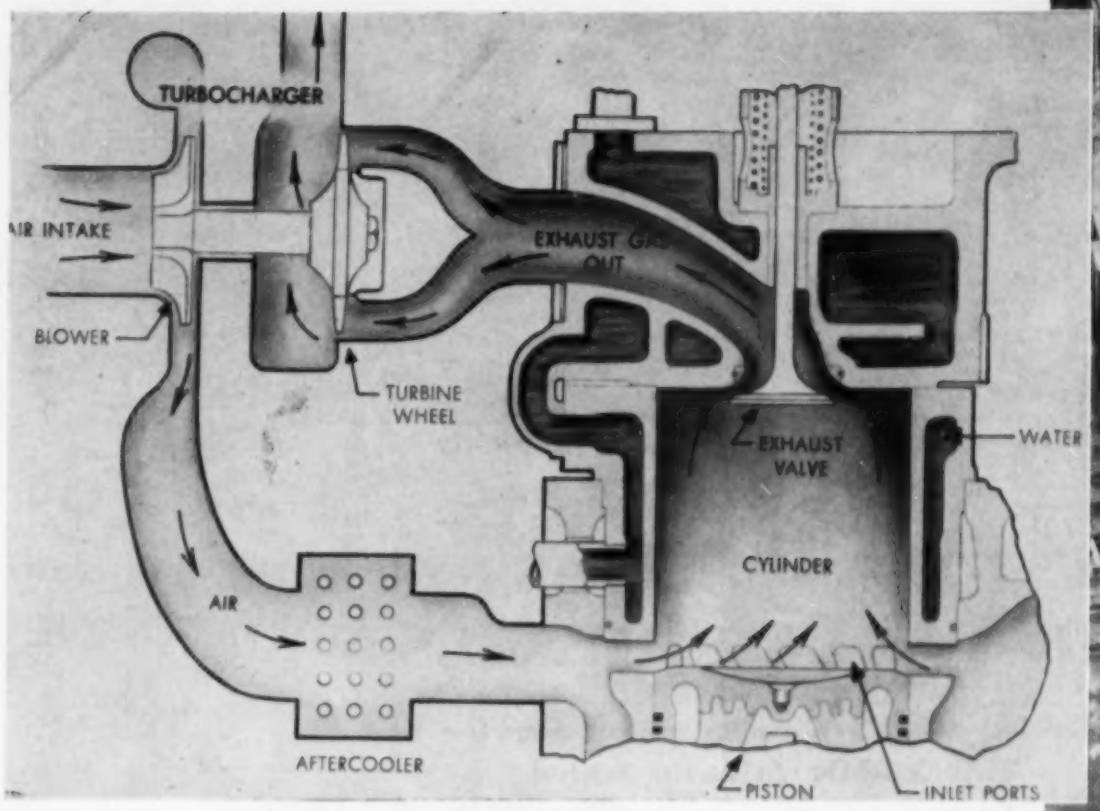
AFTER four years of research and field tests, engineers at Worthington Corporation have designed a new gas-engine compressor known as the SUTC, Turbo-Uniflo. Available in 750-2500 hp range, the newly designed engine-compressor is a two-cycle spark-ignition gas-engine compressor that operates with a completely independent exhaust gas-driven turbocharger. Operating at relatively high compression ratio, the Turbo-Uniflo has smooth combustion characteristics. This is due to the basic timing arrangement, engine configuration, and design of the exhaust manifolding. The new design results in quieter operation, low fuel and lube oil consumption, and low bmep—96.1 psi at rated speed and load. A complete absence of residual gases in the combustion chamber results in high turbocharging-scavenge ratio.

The SUTC Turbo-Uniflo is designed for pipeline transmission service; in natural gasoline plants; for pressure maintenance in oil fields to maintain all increase in flows; for oil refinery operations such as vapor recovery, re-cycling and stabilization of gases; for refrigeration systems that are required in many chemical and petroleum field processes; and in the petrochemical industry where various processes require the use of natural gas under pressure. The SUTC is applicable for any type of gas compression where suitable gas fuel is available.

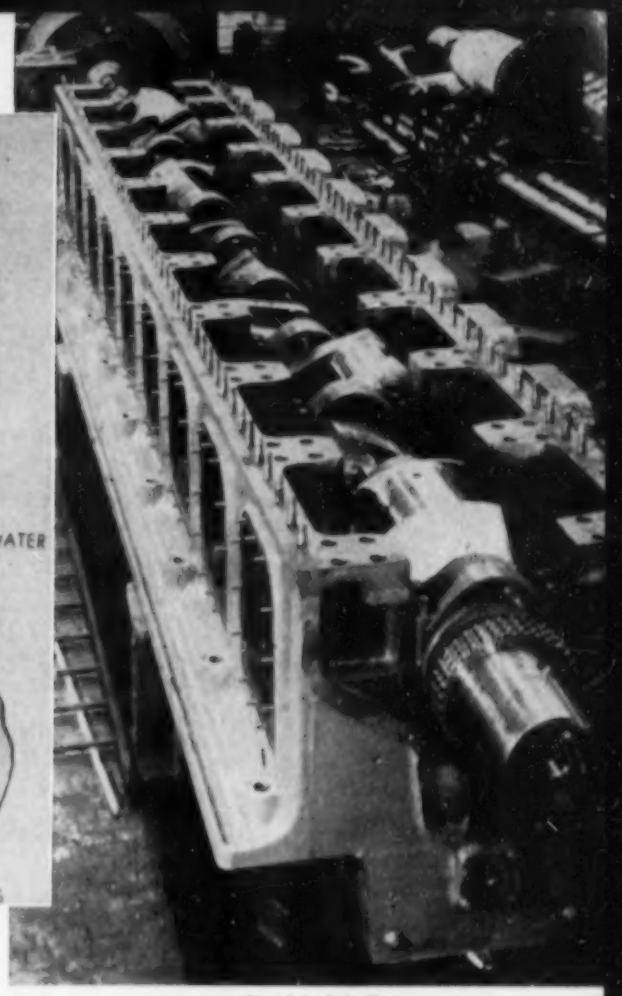
Uniflow design makes self-sustained turbocharging possible from start up through full load. Exhaust valves are timed to open and generate a pressure pulse to move the turbine blades. This gives self-sustained starting and quick acceleration without external aid or mechanical drive. A turbo-compressor delivers air under pressure to the aftercooler. Cooled air enters the cylinders through inlet ports 360 degrees around the liner. During the scavenging period, the combustion chamber walls and valves are effectively cooled. The elimination of positive displacement scavenge pumps, probably the largest single source of two-cycle engine noise, permits quieter operation. Insulated cast-iron exhaust manifolding, and a large scavenging air plenum chamber are incorporated in the one-piece, cast-iron engine frame. Extra large divided sections make for low air velocities and uniform air flow.

Extra heavy, triple-strand silent chain camshaft and governor drive also contribute to quieter operation. Hydraulic valve lifters on the cam-actuated exhaust valves assure continuous contact in the valve train, and the hydraulic valve cushion eliminates tappet noise.

The SUTC engine gives very high thermal efficiencies. Exhaust gas energy normally wasted on two-cycle engines with mechanically driven scav-



Schematic diagram of Worthington's Turbo-Uniflo system.



Crankshaft in Base.

engers is recovered by the completely independent exhaust gas-powered turbocharger. This supplies varying amounts of scavenging air, exactly matching air-gas fuel ratio proportions throughout the entire range of speeds and loads required. Because power is no longer required for a positive displacement scavenging air-source, more power is put to work in the engine compressor cylinders. The normal parasitic loop-scavenge pump load is eliminated, increasing the over-all engine efficiency and giving a much higher percentage of useful energy for compressor service.

Power cylinder head is of one-piece nodular iron construction and cone design, which provides maximum strength and freedom from expansion strains. Cylinder-head gaskets are not required. Power-cylinder liner: the main frame construction is designed for removable cylinder liners instead of separate cylinders, resulting in lower replacement costs. The cylinder water jacket is cast with the liner. Because of the low temperature at the bottom end of the cylinder, water cooling is not required below the inlet ports. This permits entirely enclosed jacket water space in the casting without water joints to pack and seal it from the crankcase of the engine.

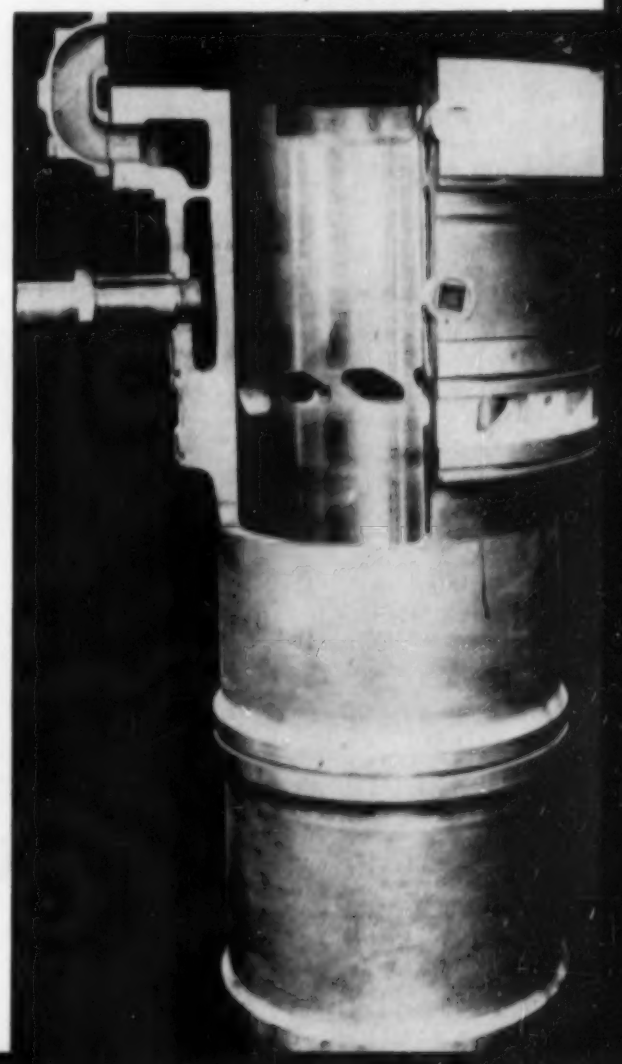
Power piston and wristpin: the wristpin is carried in a separate piece and bolted to a transverse wall in the piston. This keeps the outer piston wall unbroken and perfectly symmetrical, thereby eliminating any strain caused by wristpin fit. The absence of holes in the piston wall and the resulting symmetrical design also improves the heat flow and prevents unequal heat stress. Connecting rods are special carbon steel drop-forged and are interchangeable between the engine and compressor cylinders. The crankshaft is a one-piece, heat-treated steel forging. Oil passages are drilled for pressure-feed lubrication of bearings. The main bearings consist of shimless top and bottom shells horizontally split, which may be rolled out for inspection without disconnecting the oil piping.

The camshaft drive uses extra heavy triple-strand silent type chain drive with pressure lubrication. The turbocharger and exhaust manifold: turbocharger is completely exhaust driven and has no mechanical drive connections. Exhaust manifolding is cast iron with mechanical seal type sleeves to permit thermal expansion. Manifold sections are completely lagged. This gives the maximum energy available to the turbocharger and eliminates water-cooling thereby reducing cooling load. Air aftercooler: air inlet manifold temperatures must be kept reasonably low to maintain wide engine operational range and over-load capacity. This is important in high ambient temperature locations. Low cycle temperatures reduce maintenance on liners, heads and pistons. Individual aftercoolers mounted immediately adjacent each cylinder inlet gives maximum load capacity with accessibility.

Engine main frame and base is of one-piece, cast iron construction, with large longitudinal and transverse members, providing exceptionally large scavenging air reservoir. Lubrication: a positive driven gear pump pressure lubricates all necessary parts. The engine and compressor cylinders and compressor stuffing boxes are oiled by a force-feed lubricator driven from the camshaft drive.

The ignition system is the pulse generator type. No mechanical wearing parts on the ignition timing system in operation eliminates any ignition timing change due to wear. The fuel system uses a governor actuated, single gas control valve for maintaining speed. Each cylinder has an adjustable plug type gas valve to maintain cylinder balance.

Power Cylinder Liner.



General view of Puritan Transportation Company equipment in the storage yard.

PURITAN TRANSPORTATION USES AIR-COOLED DIESELS

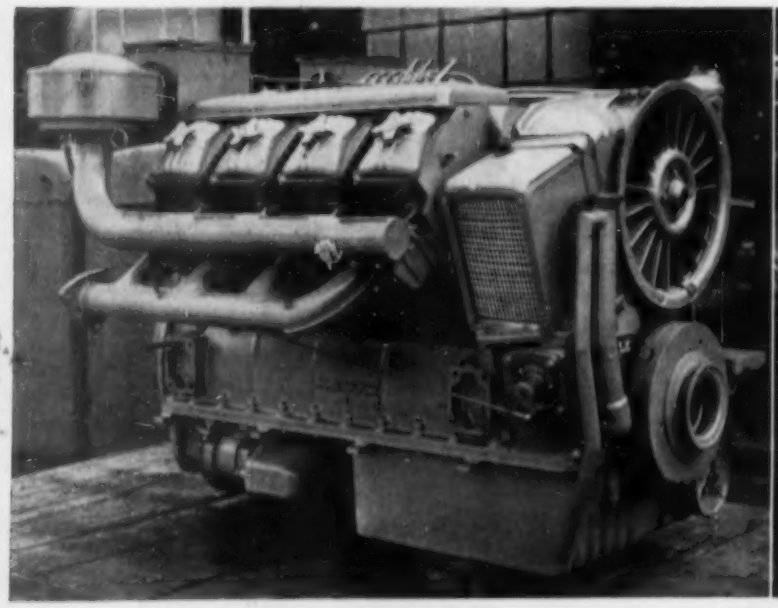
Air-Cooled Diesels Give Excellent Service In This Middle Atlantic States Common Carrier Operation.

FORTY tractors, sixty-five trailers and ten trucks in both interstate and intrastate common carrier work are operated mainly in Connecticut, New York and New Jersey by the Puritan Transportation Company. Several of their tractors are equipped with Klockner-Humboldt-Deutz air-cooled diesels. Mr. Robert C. Champagne, Vice-President of this Bridgeport, Conn. company, tells of how he first came across the Deutz air-cooled diesel at the New York boat show five years ago. Puritan was then considering running some tests on diesels, and so after they had a good look at the features of the Deutz engine, one six cylinder and one eight cylinder Deutz diesel were purchased. Both engines were installed in Federal 45 M-2 trucks and used in comparable service. The Deutz engines were thoroughly tested in day to day service, and were subjected to very severe usage in the testing program.

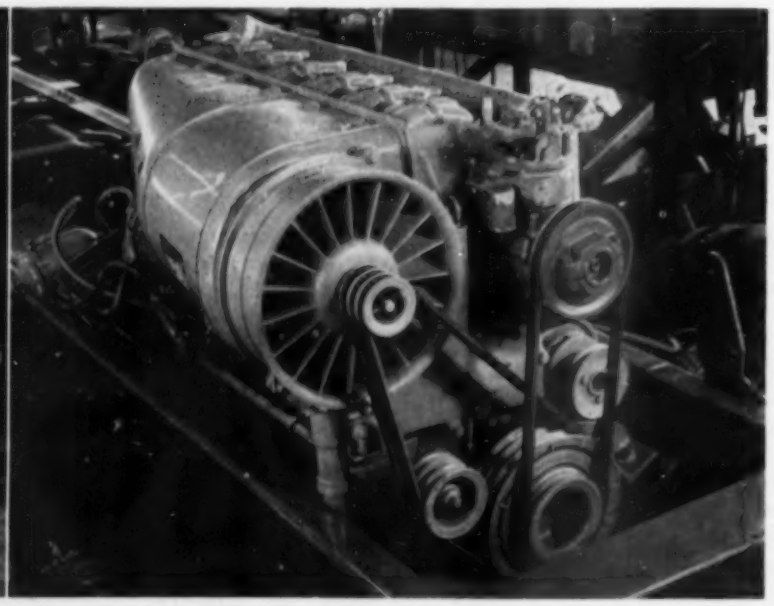
After two years of this thorough road testing under all kinds of daily service, Puritan was so satisfied with the performance of the Deutz diesels that they purchased five more diesels from Diesel Energy Inc., the United States distributor for Deutz. They now have on order three more Federals of their own design to be equipped with 8 cylinder V-type Deutz diesel engines.

The two original test engines delivered excellent fuel economy and ran more than 270,000 miles without requiring any major overhaul. There was no cooling problem during four summers of operation, with no overheating trouble occurring in various types of daily use. Because the Deutz diesel is air-cooled, there is no radiator, no water pump, no hose connections for the cooling system, and no anti-freeze to worry about. The Deutz engines also gave excellent account of themselves in cold weather starting, although Puritan stores its truck tractors outside in all kinds of weather. This can be attributed to the pre-heater unit built into each cylinder of the Deutz diesel.

New Deutz V eight cylinder diesel for automotive service.



Deutz six cylinder in-line engine used in Puritan tests.



Irrigation has transformed Texas' Lower Rio Grande Valley from a land of mesquite, cactus and rattlesnakes into the richest agricultural region in the state. Members of irrigation districts pay for each watering at the rate of about $1.50 per acre. On this citrus farm, each row of trees is surrounded on four sides by shallow ditches. When a gate in the canal levee is opened, water rushes through these ditches and is controlled by a man working with a hoe. By building up little dams and breaking through them at proper moments, a single man can water 12 acres in one day.

THE YELLOW ROSE OF TEXAS

THE lower Rio Grande Valley of Texas, the state's richest agricultural region, is a melting pot of the old and new. Tucked away in the extreme southeast corner of the state, this is where the old world of Mexico and the new world of the United States come together, forming a union which promises to bring ever-increasing prosperity in the future for both.

Typical of this strange wedding are two pumping stations located along the Rio Grande River at Harlingen, Texas, and just south of La Feria, Texas. Here the newest and oldest in diesel pumping equipment are installed, four old Type Y Fairbanks-Morse diesels working side-by-side with two Model 38F5¼ Fairbanks-Morse opposed-piston engines. Originally installed in 1918 as "hot head" semi-diesels, the 37-year-old engines are still used extensively and at surprisingly high economy to drive 30-in. centrifugal irrigation pumps. The "small" O-Ps are in the same service and carry the full brunt of the pumping load. They were installed in December, 1954, and March, 1955, respectively.

An example of the efficiency and economy at which the veteran engines are operating is the 1954 operating record of the La Feria plant. Here, just prior to the installation of a new O-P, three 200-hp., 257-rpm, Type Y, installed in 1918; a 300-hp., 300-rpm Fairbanks-Morse Model 32E14 diesel, installed in 1947; and a 450-hp., 300-rpm, Fairbanks-Morse Model 32E14 diesel, installed in 1948, pumped a total of 84,240 acre feet of water over 33,250 acres at an average operating and maintenance cost of 38.9¢ per acre-foot. This includes the costs of station labor, supervision, maintenance (labor and parts), fuel oil, lube oil, oil purification, and miscellaneous supplies. Fuel costs alone averaged 18.9¢ per acre foot. With the installation of the new O-P these costs are expected to be reduced to an even lower figure in 1955.

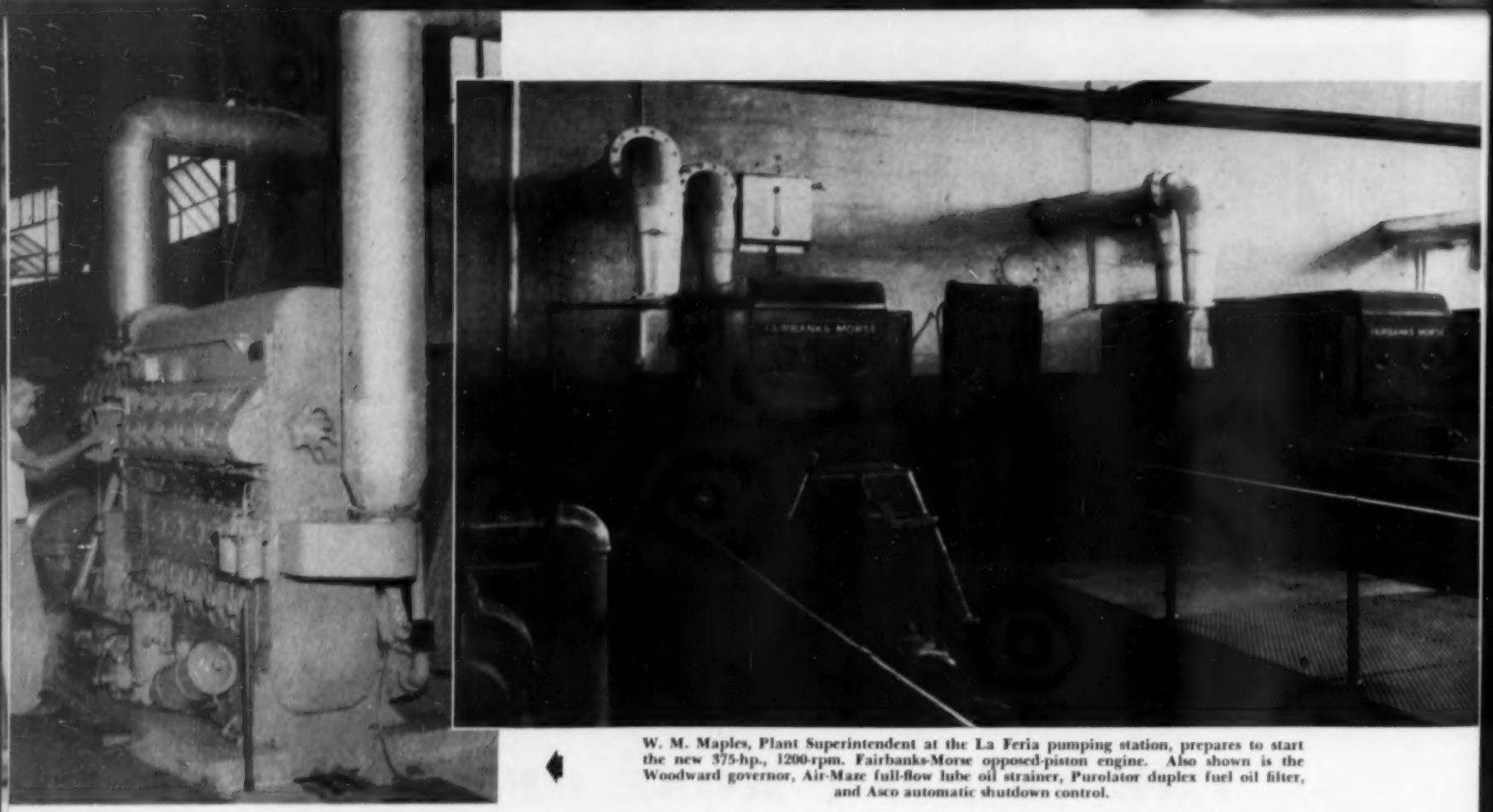
Six 360-hp. Type Y Style VA Fairbanks-Morse diesels were formerly in service at the Penitas, Texas, pumping station. Originally installed in 1927, these veteran units were replaced in 1952 by an equal number of 520-hp. Model 31AD8½ Fairbanks-Morse dual-fuel units. However, despite their 28 years of operation, the six Type Y diesels had not yet seen the last of their service in the Lower Rio Grande Valley. Far from being ready for retirement, they were immediately purchased by the Hidalgo County Water Control and Improvement District No. 16 and reinstalled at a new pumping station now being completed at a point on the Rio Grande River just west of Mission, Texas. Working side by side with two 300-hp. Model 38F5¼ "lil" O-Ps, the 28-year-old Type Ys are expected to supply irrigation water for the district indefinitely. To complete the wedding of old and new in this unusual valley, District No. 16 has also installed at one of its relift stations two 600-hp. Model 38F5¼ dual-fuel O-P engines, equipped for spark-ignition gas, or straight oil operation—Fairbanks-Morse's most recent development in diesel engine design.

The valley encompasses the fourth southernmost counties in Texas: Cameron, Hidalgo, Willacy and Starr. All but Willacy County, which is directly north of Cameron County, front on the Rio Grande River. Together the four-county area embraces 4,226 square miles or 2,704,640 acres, of which an estimated 2,000,000 acres are under cultivation. The area has an 11-month growing season, due to its semi-tropical climate. As a result, despite an abundance of other resources, approximately 650,000 acres must be irrigated regularly from the Rio Grande, one of the hardest-worked rivers for that purpose in the world..

The history of irrigation in the Valley goes back to 1876, when Louis Brulay began to water his sugar cane plantation near Brownsville. Today the International Boundary and Water Commission, which administers the Rio Grande's waters, estimates the average river yield at 2,560,000 acre feet annually. Of this the United States is entitled under treaty with Mexico to 58.6 percent, or 1,500,000 acre feet of water for irrigation, domestic and industrial uses.

To bring this water to their individual holdings, Valley farmers have banded together and formed a total of 34 water control and improvement districts, digging their own canals and providing their own pumping and control facilities. While the districts are dependent upon the state water commission for water rights and must operate within the regulations of the International Boundary and Water Commission, they operate as independent, private agencies, responsible only to their individual landowner members.

One of the largest irrigation districts in the Valley is the Hidalgo County Water Control and Improvement District No. 1, with a pumping capacity of 450 cfs., or 202,500 gpm. District No. 1 is an outgrowth of the old La Lomita Irrigation & Construction Co., which began operation at Penitas in 1907. By 1926, the fledgling district had gained all necessary water rights and bond-issuing powers and work was begun on the construction of a new pumping station and extension of the existing canal works. Six Type Y Style VA Fairbanks-Morse diesels, each rated 360-hp. at 257 rpm and



W. M. Maples, Plant Superintendent at the La Feria pumping station, prepares to start the new 375-hp., 1200-rpm. Fairbanks-Morse opposed-piston engine. Also shown is the Woodward governor, Air-Maze full-flow lube oil strainer, Purolator duplex fuel oil filter, and Asco automatic shutdown control.

driving a 30-in. centrifugal pump, were installed and the first water pumped later in that same year.

The district is governed by a five-man board of directors, elected from among the membership for a term of two years. This board hires a manager, who actually directs the district's affairs but is responsible in all matters to the board. The district meets all irrigation needs for an area of 35,000 acres and in addition sells water to the neighborhood Hidalgo County Water Control and Improvement District No. 15, which has no river pumping facilities. The addition of this district increases the number of acres served to 60,000, one of the largest irrigation areas in the Valley. C. I. Haven is manager of HCWC&I District No. 1 and E. E. Gibson is manager of HCWC&I District No. 15.

In 1952, after 26 years of heavy-duty service, the old Type Y, Style VA diesels were removed one by one to make way for six dual-fuel engines of greater capacity. The decision was made principally to take advantage of low-cost natural gas and to meet increased irrigation requirements. As already noted, these old Type Y diesels were immediately purchased by the newly formed HCWC&I District No. 16, for which 13,000 acres of mesquite are being cleared for development about eight miles west of Mission, Texas.

The six new dual-fuel engines installed are Model 31AD8½ Fairbanks-Morse units, rated 520 hp. at 514 rpm., and having eight cylinders of 8½-in. bore and 11½-in. stroke. They are Enbloc units, completely enclosed, and are connected through vertical offset reduction gears to six Fig. 800 Fairbanks-Morse double-suction centrifugal pumps. These pumps are equipped for 36-in. suction and 30-in. discharge and at 300 rpm. are rated at 75 cfs. or 33,800 gpm. against a total head of 38 ft.

Installation of the six new Model 31AD8½ Fairbanks-Morse diesels was staggered in order to avoid interruption of service at the pumping station. The first unit went into operation on March 25, 1952. The others then followed on June 4; October 24; January 22, 1953; January 25, and January 27. In a 12-month period ending May 31, 1955, the six engines were in operation 47 per cent of the time, recording 25,062 engine hours of service. In that period, they pumped 140,674.7 acre-feet of water while consuming 76,693.72 MCF of natural gas at the rate of 3060 cu. ft. per hour. This represents an average of just 545.1 cu. ft. per acre foot. At the same time the engines consumed a total of 6030 gals. of pilot oil at a rate of 0.042 gal. per acre foot.

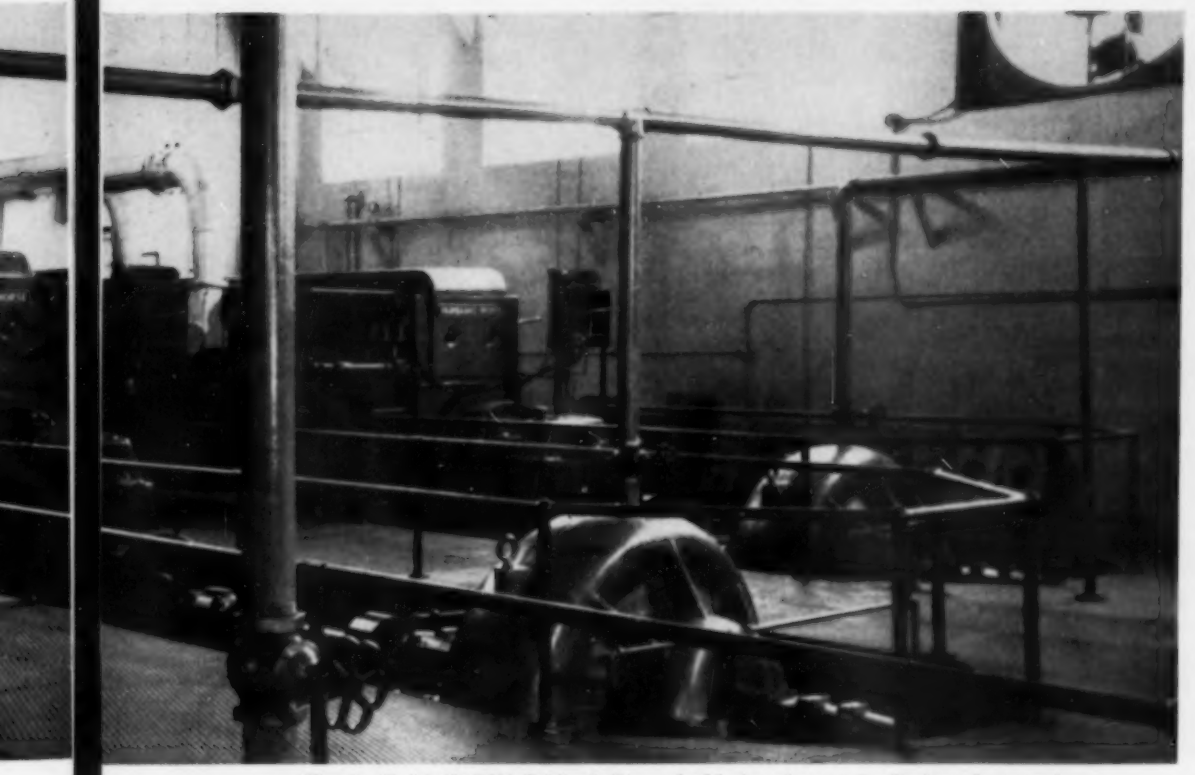
At the La Feria plant, a new 5-cylinder Fairbanks-Morse Model 38F5¼ opposed-piston diesel engine, rated 375 hp. at 1200 rpm, was installed in March, 1955, to drive the same 30-in. double-suction centrifugal pump formerly driven by a 200-hp., 257 rpm. Type Y Fairbanks-Morse diesel. Between the "lil" O-P and the reduction gear there is an Air-Flex flywheel-mounted coupling and between the reduction gear and pump there is a flexible coupling for added protection.

Also installed at the La Feria plant is a 6-cylinder Fairbanks-Morse Model 32E14 diesel, rated 450 hp. at 300 rpm., which was installed in 1948. This heavy-duty engine drives a 42-in. double-suction centrifugal pump rated at 50,000 gpm. against a total head of 23 feet. Another Fairbanks-Morse Model 32E14 diesel, this one with four cylinders and rated 300 hp. at 300 rpm., was installed in 1947 to drive a 36-in. double-suction centrifugal pump which is rated at 40,000 gpm. against the same 23-ft. head. In addition there are two Fairbanks-Morse Type Y diesels, rated at 200 hp. at 257 rpm., which were installed in 1918 and which are still in regular service.

Their total operating and maintenance cost in 1954, the year preceding the installation of the new O-P, was 38.9¢ per acre foot, with fuel costs at 18.9¢ per acre foot. Indications are that figures for the current year will reflect the improved efficiency achieved with the new engine. E. B. Worley is manager of this District.

The Harlingen district is known officially as Cameron County Water Control and Improvement District No. 1, with its main pumping station located at Harlingen, Texas, on the banks of the Rio Grande. Surrounding elevation is 65.24 ft. above sea level, with the river at 40.9 ft. and the center line of the pumps at 53.12 ft. The pumps, therefore, operate under a suction lift of 12.22 ft. Like the La Feria plant, this is one of those unusual valley pumping stations which manage to combine the newest and oldest diesel equipment with high operating efficiency. In Dec., 1954, one of the Harlingen plant's three 200-hp Fairbanks-Morse diesel, dating to World War I days, was replaced with a new Model 38F5¼ F-M opposed-piston diesel, rated 375 hp. at 1200 rpm. The new O-P with five cylinders of 5¼-in. bore and 7¼-in. stroke, drives the same 30-in. double-suction centrifugal pump formerly driven by the old unit. Pump speed, however, has been increased from 257 rpm. to 319 and the pump is now rated at 33,800 gpm. against a total dynamic head of 21 ft.

Also installed in the main pumping station is a 4-cylinder Fairbanks-Morse Model 32E14 diesel, rated 300 hp. at 300 rpm. and direct-connected to a



The six Model 31AD8½ Fairbanks-Morse dual-fuel engines at the Penitas plant are installed at opposite ends of the 100-ft. long pumping station, three engines at each end. Each is connected to a 30-in. Fairbanks-Morse Fig. 800 double-suction centrifugal pump through vertically-offset Falk reduction gears and F-M flexible coupling. The engines are rated at 520 hp. and the pumps at 33,800 gpm. against a discharge head of 38 ft.

36-in. centrifugal pump rated at 40,000 gpm. against a 21-ft. head. In addition there are the two remaining Type Y F-M diesels each driving a 30-in. centrifugal pump rated at 23,000 gpm. at the same head. Housed in a separate building, several hundred feet up the river, is an 8-cylinder Fairbanks-Morse Model 31AD8½ diesel, similar to those installed at the Penitas plant. Rated at 520 hp. at 514 rpm., this Enbloc unit is connected through a vertically-offset reduction gear and flexible coupling to a 54-in. Fig. 5720 Fairbanks-Morse double suction centrifugal pump which is rated at 60,000 gpm. against a 22.5 ft. discharge head. Pump speed is 285 rpm. Together, these five diesel pumping units give the Harlingen plant a pumping capacity of 400 cfs. or 179,800 gpm. Manager of the District is M. T. Martin.

Of the 34 irrigation districts in the Lower Rio Grande Valley, 31 are dieselized, two are steam-powered, and only one is electric powered. All have this in common, however: the economy of the entire valley depends upon the continuous trouble-free operation of their pumping equipment. Without such dependability, the effectiveness of irrigation throughout the 650,000 acres served would be seriously hampered—and without irrigation, the agrarian economy of the valley would collapse.

Penitas Pumping Station

Engines—Fairbanks, Morse. (6) Model 31AD 8½, 8-cylinder, 8½ x 11½, dual-fuel engines, rated 520 hp at 514 rpm.
Pumps—(6) Fairbanks, Morse.
Reduction gear—Falk.
Lube oil by-pass filters—Fairbanks, Morse.
Lube oil—Sinclair.
Water softener—Fairbanks, Morse.
Tachometers—Weston.
Air compressor—(1) Gardner-Denver (1) Fairbanks, Morse.
Vacuum pump—Roots-Connersville.

La Feria Pumping Station

Engines—Fairbanks, Morse. Model 38F5¼, 5-cylinder, 5¼ x 7¼, opposed-piston diesel engine, rated 375 hp at 1200 rpm.
Pump—Dayton-Dick.
Reduction gear—Lufkin Foundry & Machinery.
Auto. temperature control valve—Amot Controls.
Auto. shutdown control—American Safety Controls.
Water softener—Permutit.

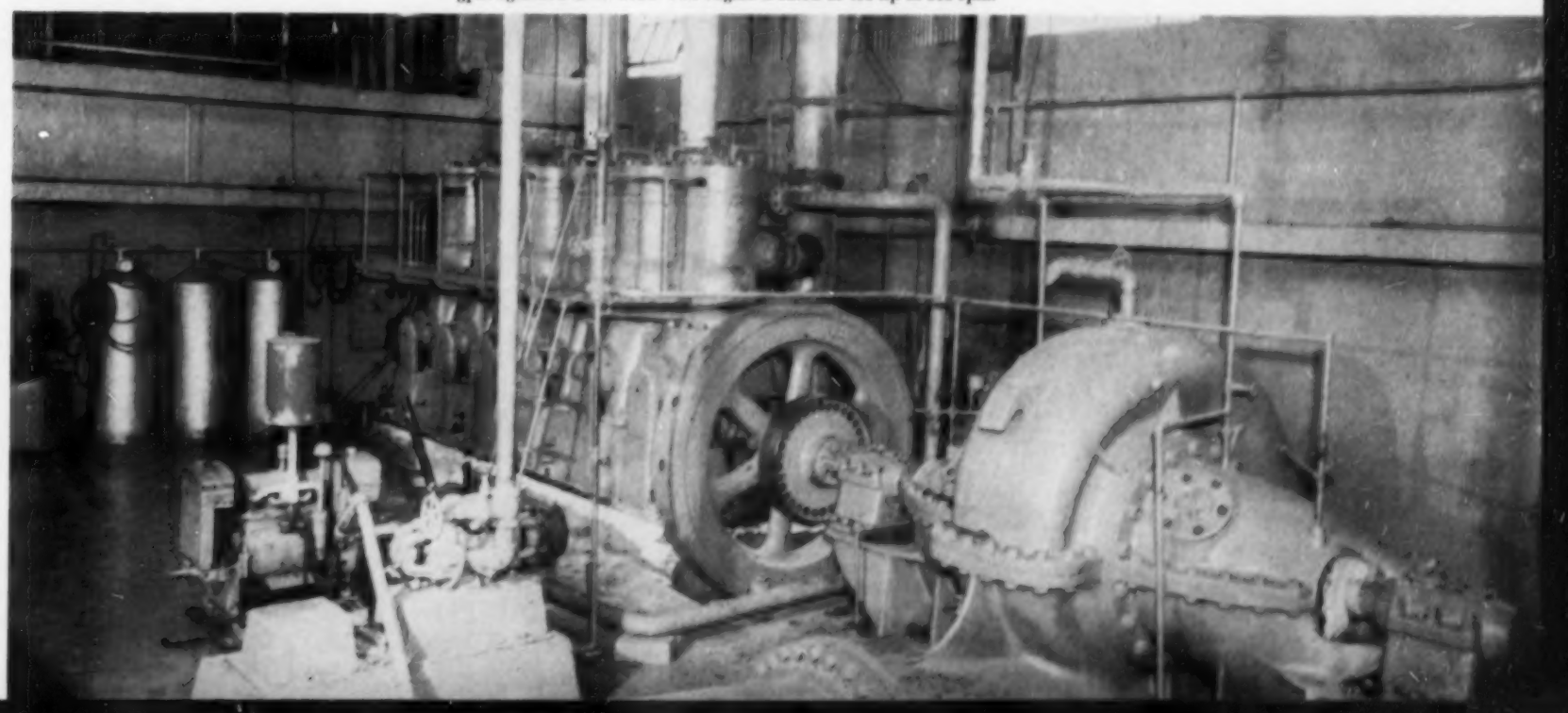
Harlingen Pumping Station

Engines—(2) Fairbanks, Morse. Model 38F5¼, 5-cylinder, 5¼ x 7¼, opposed-piston diesel engine, rated 375 hp at 1200 rpm. Model 31AD8½, 8-cylinder, 8½ x 11½, diesel engine, rated 520 hp at 514 rpm.
Pumps—(1) Fairbanks, Morse.
Reduction gear (Model 31)—Farrell-Birmingham.
Chain drive—Morse-Hyvo.
Lube oil by-pass filters—Fairbanks, Morse.

Equipment Common to All Nine Fairbanks-Morse Engines

Governors—Woodward.
Flexible couplings—Fairbanks, Morse.
Fuel oil duplex filters—Purolator.
Lube oil strainers—Air-Maze.
Gauge boards—Fairbanks, Morse.
Pressure gauges—Marshalltown.
Exhaust pyrometers (except O-P at Harlingen)—Alnor.

Largest capacity pumping unit at the La Feria plant is this 6-cylinder Fairbanks-Morse Model 32E14 diesel which drives a 42-in. double-suction centrifugal pump rated at 50,000 gpm against a 23-ft. head. The engine is rated at 450 hp at 300 rpm.



The Poughkeepsie branch of Edward Ehrbar, Inc. maintains an open air display of dieselized equipment spotlighted at night against a white background. Display room, service department and executive offices are housed in this low-maintenance type of structure.

DIESELIZED NATURAL CEMENT

By A. B. NEWELL

BESIDE the fact that dieselized equipment is used underground and on the surface at the Century Cement plant in Rosendale, New York, there are many interesting things about the place. For example, the electric shovels and the diesel loaders work in an underground mine having 45 acres of space that took 126 years to dig. At the present production rate of 2000 bbl. of natural cement per day the reserve supply of raw material will last 200 years. As a matter of passing interest mushrooms are grown in old caves of the mine.

Prior to the use of diesel dozers and loaders, the work had started by hand followed by the use of mules and horses and then gasoline engine powered locomotives operated on narrow-gauge tracks to carry the stone from the crushers to the kilns. Continuous operation of gasoline engines underground could not be tolerated because of the danger of carbon monoxide poisoning even though the mines have a remarkably fine system of natural ventilation. Intermittent gasoline motor operation continues as in the case of trucks going in and out of the mine to bring out the stone blasted loose and picked up by shovel or loader.

Ventilation is a continuation of a system of working by natural light and natural circulation of air at the start over a century and a quarter ago. A series of openings pierced the hillside through which light shone and air entered. Natural pillars of stone about 30 ft. in diameter were left to support the roof of the man-made caverns which eventually penetrated beyond the range of daylight whereupon kerosene lamps were used. The entire area is now brightly illuminated by electricity. The stone pillar roof-supporting method continues.

Original discovery of the cement rock was made on the farm land of Jacob L. Snyder during construction of the Delaware & Hudson Canal being built to bring Lackawanna Valley coal to New York City where cordwood was then used for heating purposes. The formation was thought to be limestone of value in agriculture but when burned in a blacksmith forge and ground in a grist mill it turned out to be cement rock. Thereafter numerous cement making enterprises grew up near Rosendale and had their ups and downs. Then in 1850, A. J. Snyder erected a battery of kilns to calcine cement rock and shortly thereafter he built his first mill. During the following 100 years no substantial change has been made in the design and operation of the kilns then built. They are about 40 ft. high and 10 ft. in diameter lined with brick, on a hillside, fed with cement rock and pea coal which moves downward progressively until burning of the rock is ended and removed at bottom. Now it is a fourth-generation enterprise and the company is headed by Andrew J. Snyder II who continues the family policy of progressive advancement and modernization with economy and efficiency being a matter of prime importance. This is reflected in total abandonment of all older and less efficient equipment and the use of diesels where practicable for rock movement.

Diesel driven International Harvester tractor with Drott loader works underground without danger to the men for the exhaust gives off no carbon monoxide.

Having in mind the production of 2000 barrels of natural cement daily, we note that diesel dozers and loaders are needed in the general process of moving rock to the crusher from where it is belt conveyed to a sizing plant and then trucked to three batteries of kilns totaling 38 in number. All told this requires a lot of rock movement of one kind or another and aside from the inherent economy of diesel operation and the safety while working underground, the rapid portability of the equipment has many advantages. The Payloader on rubber seems big and cumbersome, but it scoots from place to place with amazing rapidity.

Anyone fortunate enough to be taken into the mine by automobile and driven over a mile or so of subterranean road is apt to see an International Harvester TD-18 dozer or one of the Hough Payloaders hard at work while similar equipment will be found out in the open wherever tonnage movement is required. The tonnage will be, of course, cement rock in the raw or the burnt stage. This International Harvester equipment was supplied by the somewhat fabulous Harvester distributors in the Metropolitan New York area. Edward Ehrbar, Inc. with headquarters in Brooklyn and branches in many places including Poughkeepsie where the Century Cement Company bought theirs. This includes a TD-14-A with Drott Loader, a TD-18 dozer, two Hough Payloaders equipped with the UD-9 engine and a Model H.M.D. 1½ yd. front end loader on rubber, powered by a DJXH Hercules motor of 85 hp. Aside from the general excellence of this equipment there is great advantage in excellent service facilities when the vendor is so near at hand. It is only, you might say, a "whoop and a hurrah" from Poughkeepsie to Rosendale.

The Century Cement Company goes to some pains to explain the inherent advantages of natural cement compared to portland composition which is in more universal use. The natural cement is not a composition and it is a more durable product. It is, therefore, used in public buildings and for highway facing. Many great edifices such as the foundation for the wings of the National Capital in Washington, foundation for the Statue of Liberty and many big engineering works such as the old Brooklyn Bridge and the modern Whitestone Bridge have Rosendale natural cement in their construction because of its greater durability than manufactured portland cement.

Generally speaking the natural cement for the surrounding countryside is designated as Rosendale Cement but not all of it was produced by Century. The essential difference between this one company and others is that it has survived all industry setbacks and is a flourishing business in a region where many others failed. While dieselization of the equipment could not be responsible for economies and efficiencies great enough to make or break an operation such as this, it is very evident that a managerial policy of utilizing equipment so highly efficient as the diesel points up the reasons for the success of a four-generation business.

G

NEW ADVANCE IN DIESEL POWER

CUMMINS **TURBODIESEL** ENGINE

(trademark)

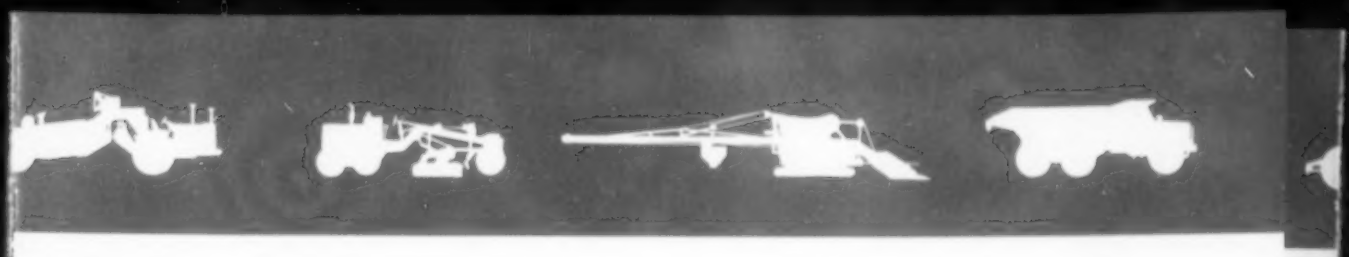
ONLY CUMMINS OFFERS A COMPLETE LINE OF *TURBODIESELS*!... THE LATEST AND MOST ADVANCED IMPROVEMENT IN DIESEL POWER!

Cummins *TURBODIESELS* convert ordinarily wasted power into usable power! This means more work from the same amount of fuel.

A *TURBODIESEL* is a Cummins engine that utilizes the normally wasted energy of exhaust gases by means of a turbocharger to develop additional horsepower. More power is obtained from a *TURBODIESEL* than from a naturally aspirated engine or engine of equal displacement, reducing the weight per horsepower. By forcing more air into the cylinders, the turbocharger makes possible more efficient burning of a greater fuel charge, creating additional horsepower.

The red arrows trace the flow of exhaust gases through a turbine chamber which turn a turbine wheel (left). The turbine wheel is mounted on the same shaft as the air impeller (right) in the air chamber.

The blue arrows indicate how the rotation of this impeller draws air from the outside and blows it under pressure into the intake manifold and engine cylinders.



EFFICIENCY

Here is the engine that is revolutionizing the truck and bus industries. The JT weighs from 450 to 800 pounds less than other diesels of comparable power. This tremendous weight advantage means that diesel truck operators can earn from $1000 to $2000 in additional revenue every 100,000 miles. (Based on 300 trips of 300 miles each, and revenue of 80¢ per 100 lbs.)

More than 100 million miles of on-the-job performance have proved the JT's unmatched efficiency and economy as an automotive engine. The JT gives you maintenance costs lower than other diesels, *and as low as gasoline!* Compared to gasoline, the JT gives a 25% saving in maintenance hours!

The JT also is ideal power for medium construction, mining or marine equipment. This engine delivers the rugged, dependable performance that cuts work cycles—lowers operating costs.

POWER

Any piece of equipment powered by an internal combustion engine in this horsepower range will operate more efficiently, and economically, powered by one of these four great Cummins *TURBODIESELS*.

Cummins gives you a choice of horsepower so that you can accurately tailor power to your job needs. This avoids the excessive initial costs inherent in overpowering . . . the excessive fuel and maintenance costs inherent in underpowering.

These four great *TURBODIESELS* are thoroughly job-proved. They are particularly popular in construction and mining equipment, where their big power makes possible faster work cycles and more payloads.

DEPENDABILITY

Here is big power in a compact package. No other commercially available engine of comparable horsepower approaches the VT-12 Cummins *TURBODIESEL* for light weight and small size. The VT is easily moved from one location to another. And it costs much less than heavier, slow-speed diesels which develop comparable horsepower.

The VT-12 *TURBODIESEL* can cut the cost in any installation which must be moved from location to location, such as an oil well drilling rig. It makes possible higher powered portable generator sets and pumping units. In marine applications, it frees valuable space for cargo carrying. The VT-12 can be compounded to provide up to 2,400 h.p.

and what it offers to power users!

LOWER FUEL CONSUMPTION

Cummins *TURBODIESELS* deliver greater fuel economy than either non-supercharged or mechanically supercharged gasoline or diesel engines.

MORE HORSEPOWER, BETTER PERFORMANCE

Cummins *TURBODIESELS* deliver more horsepower than non-supercharged or mechanically supercharged diesel engines of equal displacement.

SMALLER SIZE, LOWER WEIGHT

Cummins *TURBODIESELS* are more compact, weigh less than non-supercharged or mechanically supercharged diesels of equivalent power.

How Cummins *TURBODIESELS* offer more profit to power users:

3 *big advantages!*	1 More work on the same amount of fuel!	2 More power for better performance!	3 More power per lb. of engine!
over non-supercharged diesels! ▶	If a non-supercharged diesel does this much work per gallon of fuel:	If a non-supercharged diesel delivers this much horsepower per cubic inch of displacement:	If a non-supercharged diesel delivers this much horsepower per pound:
and over supercharged diesels! ▶	a supercharged diesel will do this much work:	a supercharged diesel will deliver this much:	a supercharged diesel of equivalent weight will deliver this much power:
	but a Cummins *TURBODIESEL* will do more work per gallon of fuel than either!	but a Cummins *TURBODIESEL* will deliver more than either!	but a Cummins *TURBODIESEL* of equivalent weight will deliver more power than either!
If you run trucks or buses ▶	"Work" is *mileage*. Cummins *TURBODIESELS* mean more ton-miles per gallon than gasoline or other diesel engines.	Cummins *TURBODIESELS* make possible faster schedules . . . better performance on hills . . . at altitudes . . . in traffic, than gasoline or other diesel engines.	Cummins *TURBODIESELS* make possible bigger pay loads . . . dependable diesel power and economy . . . more profit.
If you use construction, mining, logging, drilling or marine equipment ▶	"Work" is production. Cummins *TURBODIESELS* work longer on the same amount of fuel than gasoline or other diesel engines.	Cummins *TURBODIESELS* make possible faster work cycles . . . greater work loads . . . better all-around performance.	Cummins *TURBODIESELS* increase payload capacities . . . simplify movement to location . . . allow greater cargoes.

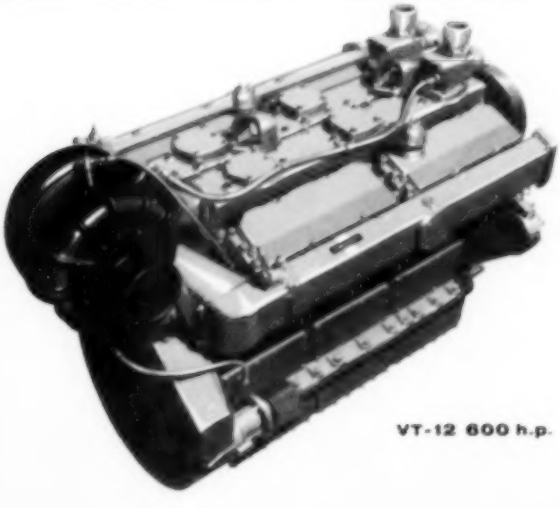
Cummins offers a full range of power for all applications!

JT-6 175 h.p.

TRUCKS
BUSES
CONSTRUCTION
MARINE

NT-6 250 h.p.
NTO-6 262 h.p.
NRT-6 300 h.p.
NRTO-6 335 h.p.

CONSTRUCTION
MINING
TRUCKS
LOGGING



VT-12 600 h.p.

MARINE
DRILLING RIGS
GENERATOR SETS
CONSTRUCTION

Cummins *TURBODIESELS* give you these advantages, too!

RESEARCH AND PRODUCT DEVELOPMENT. Continuous pioneering, research, experimentation and quality building has helped make Cummins the world's leading independent manufacturer of diesel engines. Meeting the ever-changing needs of power users by being first with the latest advances in diesel design and engineering keep "Cummins" the finest name in diesels. For more information, write for the free booklet, "Answers to Questions about Diesels."

READILY AVAILABLE PARTS AND SERVICES. Cummins worldwide distributor organization . . . the largest devoted to the sale and service of diesel engines . . . offers expert service and genuine Cummins parts at nearly 200 points throughout the United States and Canada and in over 100 export locations. Special job-site service is also offered.

LOWER FUEL AND MAINTENANCE COSTS. Cummins simple 4-cycle, overhead valve design is easy to service—assures long engine life—requires little "between-overhaul" maintenance—is easily understood by mechanics. Cost of replacement parts is low, minimizing overhaul expense. Cummins exclusive PT fuel system contains fewer parts—is easier to understand and maintain than gasoline carburetion and ignition or other diesel fuel systems. Foolproof and troublefree, this revolutionary method of fuel injection drastically reduces downtime due to fuel system failures.

MINIMUM PARTS INVENTORIES. Bearings, pistons and many other parts are interchangeable on many Cummins models. This standardization reduces overhead in parts stock—assures time and space savings—lowers maintenance costs. All components are made to exacting engineering standards under strict quality control to assure uniformity . . . lower your overall maintenance costs.

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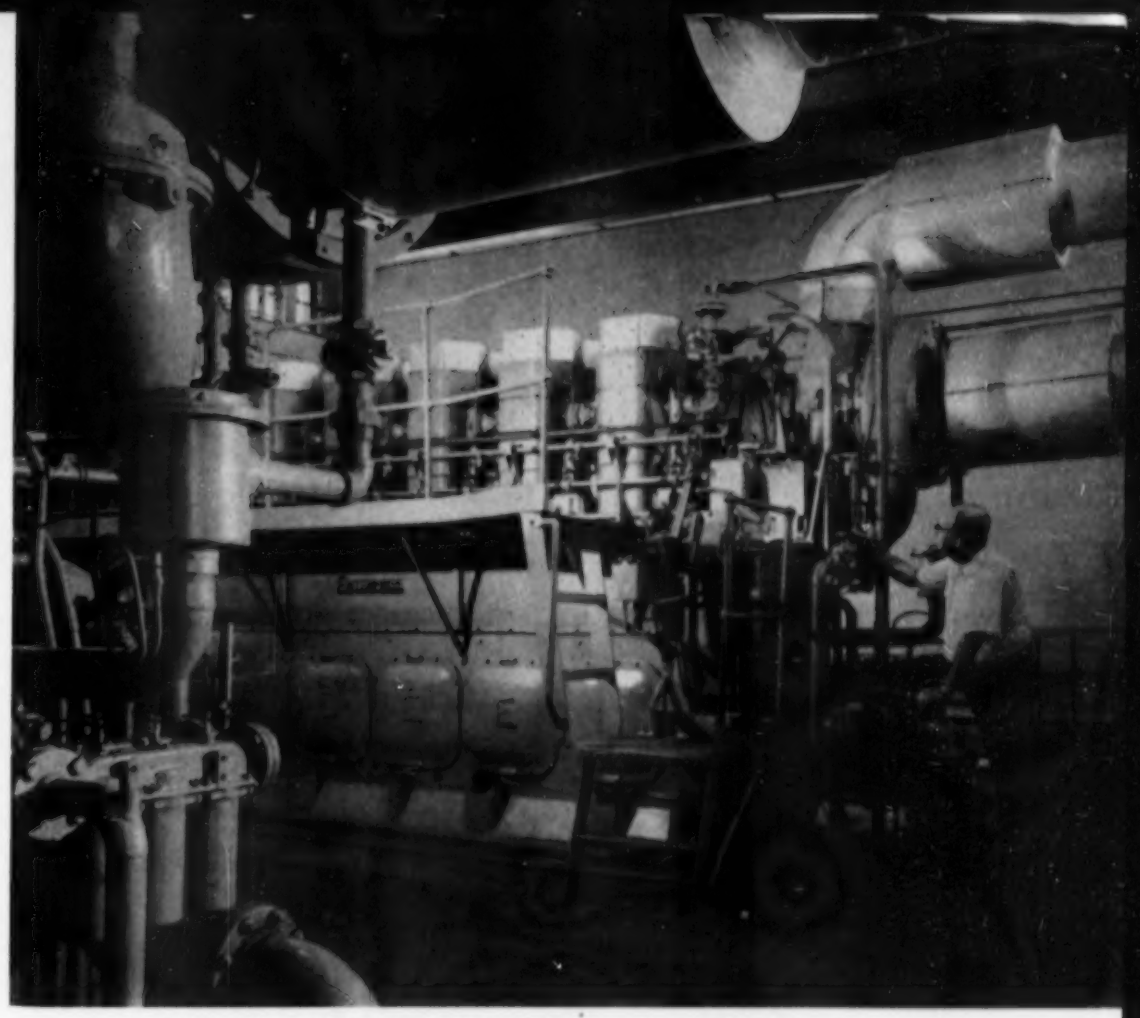


One of the two 1755 hp Enterprise diesels installed in Tipp City's municipal power plant. The electric governor actuating unit is just above the right platform handrail.

THE ELECTRIC GOVERNOR

New Westinghouse Electric Governor Anticipates Prime Mover Speed Change Through Load Sensing and Achieves Great Rapidity of Response.

By J. G. GABLE*

IN generating closely regulated power with engine-generator sets, rapidly responding governors are essential. A new electric governor developed by the Westinghouse Electric Corporation, in cooperation with the Corps of Engineers of the U.S. Army, achieves great rapidity of response through an entirely new concept—the anticipation of prime mover speed change through load sensing. Moreover, the new electric governor permits automatic load sharing by two or more engine-generator sets operating isochronously. In such operation, sets will automatically share their loads within five percent of a predetermined ratio. This is highly important in applications in which normal load deviations exceed the capacity of one engine normally run isochronously with base loaded units and in which constant frequency must be kept.

With the exception of a hydraulic throttle actuator and the hydraulic supply, these operations are performed by an entirely static system of rugged electrical components. The electric governor was designed to meet military as well as commercial standards. After extensive testing in the laboratory, the field and at the municipal power plant in Tipp City, Ohio, the new governor has fulfilled its design objectives. In this new equipment, performance, reliability, and versatility are quite evident.

A fundamental difference between conventional mechanical or hydromechanical governors and the new Westinghouse electric governor is that the former types sense engine speed, while the electric governor regulates not only on the basis of frequency (or speed), but is also able to anticipate imminent frequency changes by a continuous sensing of the instantaneous load upon the generator. Immediately that an increase or decrease in load is sensed, the electric governor acts to forestall any frequency deviations. As a result, the time required to return the system to the desired steady state conditions is minimized, and frequency deviations can be kept within very narrow limits, as demonstrated in Fig. 1.

As the function diagram of Figure 2 shows, the new governor comprises two basic systems—an electric control unit and a hydraulic actuating unit. Serving as the information and decision center of the governor, the electric control unit measures three variables: generator frequency, generator load, and engine throttle position. In this control unit an electrical summation of these variables is magnetically amplified as a resultant error signal. This error signal is applied to the hydraulic actuating unit which serves as the muscles of the governor. On receipt of intelligence, the actuating unit then converts electrical information into the proportional hydraulic forces which through the action of a piston and mechanical linkage actually act to position the throttle.

As a result of this integration of virtually instantaneous electrical circuitry and a highly responsive high-force hydraulic system, throttle change begins in approximately .015 seconds. Full travel is completed in an interval as short as .100 seconds after application or rejection of full load. In small, well-designed, high-speed engine-generator sets, this rapid response has produced typical maximum transient speed deviations of less than 1.5 percent and recovery to steady state conditions has occurred within one second after application or rejection of full load. These test results were obtained with low-damped, photoelectric laboratory recording instruments capable of high transient response. Slower, more heavily-damped instruments of the switchboard type often fail to record any deviation.

As the center of intelligence for the governor, the electric control unit, Figure 3, is contained in a separate ventilated enclosure. Entirely static, it is comprised of such stable components as transformers, rectifiers, resistors and fixed capacitors. Accordingly, circuits have long service life; they are not affected by shock, vibration or climatic changes. Electric control units designed so far have been intended for 50/60-cycle and 400-cycle applications. Voltage inputs are designed for 120 volts, to permit direct connection to generators with 120-volt phase-to-neutral connections or to permit the use of standard potential instrument transformers with appropriate primary ratings. Current signal inputs are designed for use with 1 or 5-amp secondary current transformers. For large engine-generator sets, these instrument transformers are usually available in the generator control switchgear.

Within the electric control unit a closed-loop frequency circuit is employed to measure generator frequency to correct for any deviation from a set reference frequency. This circuit is a high gain, low time-delay loop that provides a high degree of accuracy under steady state conditions and fast response under transient conditions. Its primary function is to counteract small frequency shifts at any specific load. In further detail, the closed-loop frequency circuit consists of a frequency sensitive circuit and a frequency reference circuit of the discriminator type. Both circuits combine in effect to produce an output signal voltage proportional to the difference between the reference frequency and the actual operating frequency.

The frequency sensitive circuit consists of a reson-

*Manager, Electric Governor Project, Westinghouse Electric Corporation.

The Tipp City, Ohio municipal power plant gave Westinghouse and Enterprise engineers their first opportunity to put the new electric governor through its paces under actual plant conditions. The plant's industrial load includes automatic spot-welding equipment that produces a power surge of 500 kva every two or three seconds. The Enterprise engines, rated 1755 bhp at 360 rpm and 120 bmep, drive a pair of 1240 kw generators.

ant L-C network combination whose output voltage varies with the frequency and which receives its excitation from the regulated phase of the generator. By proper tuning, the usable voltage range is placed on the essentially linear portion of the resonant curve. The output of the frequency sensitive circuit is then rectified and impressed across a resistor to provide a dc voltage proportional to frequency. The frequency reference circuit is also excited from the regulated phase of the generator. This voltage is rectified and applied across a variable resistor to provide a variable dc voltage that is independent of frequency.

Output signals from both the frequency sensitive circuit and the frequency reference circuit are compared electrically and any voltage difference then becomes the input error signal to the magnetic amplifier. In operation, the reference voltage is set to cancel the output voltage of the frequency sensitive circuit when the generator is operating at the desired frequency. When a change in prime mover speed causes a change in generator frequency, the output voltage then varies above or below the fixed reference voltage and the resulting error signal, magnetically amplified, causes the throttle to be moved in a direction to reduce the error and bring the set back on frequency. Individually considered, the output of each of these two circuits is directly proportional to the input or generator voltage. However, the effect of fluctuation of generator voltage is nullified since only the difference between the two voltages initiates frequency change. The presence of zero output signifies that desired steady state conditions prevail.

A second circuit within the electric control unit is the load responsive circuit, which accomplishes the important function of anticipating prime mover speed change by measuring the load upon the generator. Unlike a conventional governor which "sees" only engine speed and which makes corrections only after a change in speed, the electric governor foresees the effect of generator load changes on prime mover speed and repositions the throttle to a new load setting before engine speed has materially changed. As a result of this time advantage, the transient response of the system is improved to a great extent. Deviations from base frequency as a result of load changes are reduced and the time required to return to steady state shortened.

To accomplish this load sensing, ac generator loads are measured by a magnetic wattmeter circuit developed by Westinghouse. In this circuit small magnetic wattmeters or transformers measure phase current and voltage and produce an output signal proportional to the electrical load on that particular phase. Three such wattmeter circuits are required to measure a 3-phase, 4-wire unbalanced generator load. Since each phase is measured separately and the load signals are added to give the total load, phase balance is not required for proper operation. For combination-type 400-cycle engine-generator sets that include a dc generator as an appreciable percentage of the total load, a dc current measuring transductor is utilized to provide a dc load signal which when added to the ac load signal provides a totalizing load circuit to indicate the true mechanical load on the prime mover.

The third basic signal within the electric control unit indicates throttle position. This indication is provided by a throttle feed-back system which is mechanically coupled to the throttle actuator. This throttle follow-up circuit is used to stabilize the basic servo loop and does so by supplying a voltage that is equal but of opposite polarity to the load sensing signal. This circuit is therefore a null system. In operation, at the instant of load change, the load sensing circuit presents a signal that is proportional to this change and which creates a particular flux in the magnetic amplifier. The output signal produced causes the throttle to be moved in a direction to compensate for the load change. As the throttle moves, the throttle circuit furnishes a signal to oppose the original load function. When the correct throttle position is reached, the signal from the throttle circuit and the load function combine to neutralize each other.

Since the load sensing circuit gives a signal proportional to load which is nulled by the throttle position signal proportionally with throttle rotation, it may be seen that the relationship between throttle rotation and load at base frequency will be nearly linear. Slight errors in the linearity of the throttle are minimized by the frequency measuring circuit. A fourth circuit within the electrical control unit provides an operating advantage not previously available, the parallel operation of two or more units on an isochronous basis. If all engine-generator sets are equipped with the electric governors described, internal paralleling control can be used to permit all units to run on an isochronous basis, so that each unit shares its predetermined portion of the total applied load. This is especially important where the maximum load deviations on a system exceed the rating of the largest machine and frequency droop on increasing load is undesirable. This advantage is made possible by use of the load sensitive circuit to indicate what percentage of the total load is placed on that particular unit. When the signals from electric governors operating in parallel are compared, any unbalance then operates to return all of the individual sets to the desired relationship.

As designed, this new electric governor is provided with a manual control to adjust the individual unit to operate with a zero to five percent steady state speed regulation. This control therefore permits units equipped with Westinghouse electrical governors to be operated in parallel with units with conventional governors. The heart of the electrical control unit, a magnetic amplifier combines the various electrical signals, according to their proper relationship into a single amplified output.

Fig. 2: **This schematic diagram shows how various elements of the governor's electric and hydraulic systems work together in operation.**

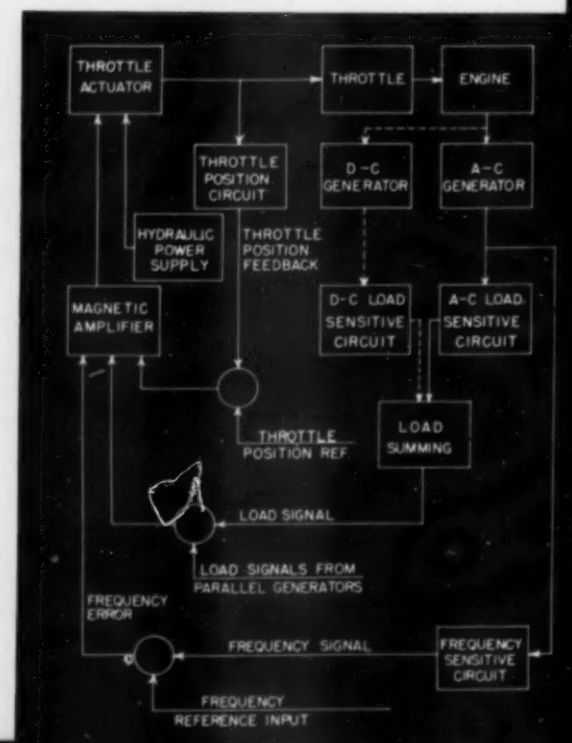


Fig. 3:
The electric governor control unit. It measures generator frequency, load and engine throttle position and after integrating the effects of all three, supplies the electrical summation to the hydraulic actuating units.

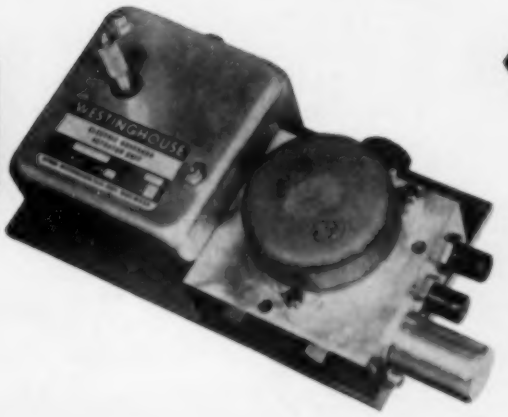


Fig. 4:
The hydraulic actuator unit. It converts signals from the control unit into hydraulic pressures to position the throttle.

Fig. 5:
The hydraulic supply for the electric governor supplies the necessary volume at proper pressure. It comprises a pump, a filter and one gallon reservoir.

It is this single output that controls the simple hydraulic actuator which performs the mechanical function of throttle correction.

The magnetic amplifiers used in the electric governor are very similar in appearance to a small transformer. They provide a full-wave, push-pull output and have input windings for load, position, frequency and paralleling, in addition to a bias-control winding and an output winding. The hydraulic actuating system receives its operational intelligence from the electric control unit, and by converting these signals to proportional hydraulic forces, acts through a piston to control the throttle.

Included in this system are a sump, pump, relief valve, filter, actuator, linkage, and throttle position feedback servo. These components may be designed in various configurations. Under present arrangements the units can be supplied separately as two packages, Figures 4 and 5, or as a completely packaged hydraulic system.

The heart of the hydraulic system is the actuator unit which converts electrical output signals from the electric control unit into mechanical motion, for actuation of the throttle. In function, the actuator employs an electrical valve which integrates the hydraulic pressure of the supply into two ports that feed the opposite sides of a hydraulic piston or vane in a closed-loop system. Under steady state conditions, these two output forces are equal so the piston is in equilibrium and does not move. But when frequency discrepancies require correction, the push-pull amplifier system causes the valve to unbalance this equilibrium and to raise the pressure on one side of the piston while lowering the pressure on the other. This unbalance of pressure causes the piston to move. Thus, the position of the piston has no effect on its operation and it can be equalized anywhere within its limits of travel.

To actuate the throttle, the linear displacement of the piston or the rotary output of a rotary vane is transferred to the throttle by an appropriate linkage system. Mechanically tied to this output linkage is the throttle servo, which relays electrically the throttle position to the position circuit of the electric control unit.

Although this system is extremely rapid in operation and highly responsive, the components are simple in construction. By the use of a closed system, slight leakage about the piston and fluctuations or oscillations of the main hydraulic supply are inconsequential to over-all performance.

As previously noted, the hydraulic supply may be furnished as separate components for easy displacement about or integration within a small engine, as a separate package for use where space permits, Figure 5, or as a complete package with the actuator unit. . . . The hydraulic supply merely furnishes the necessary volume of hydraulic fluid at the necessary predetermined pressure. It consists of a hydraulic pump with relief valve driven by a noncritical power take-off from the engine, a filter to exclude significantly large particles of foreign material and a fluid reservoir of approximately one gallon capacity. All of these components are of conventional designs obtainable in the open market. For outdoor operation in extreme hot and/or cold climates, hydraulic fluid per Military specification MIL-0-5606 is recommended which permits operation from −65 to 125 degrees Fahrenheit. For normal indoor operation at temperate ambient temperatures, any good grade of SAE-10W motor oil may be used.

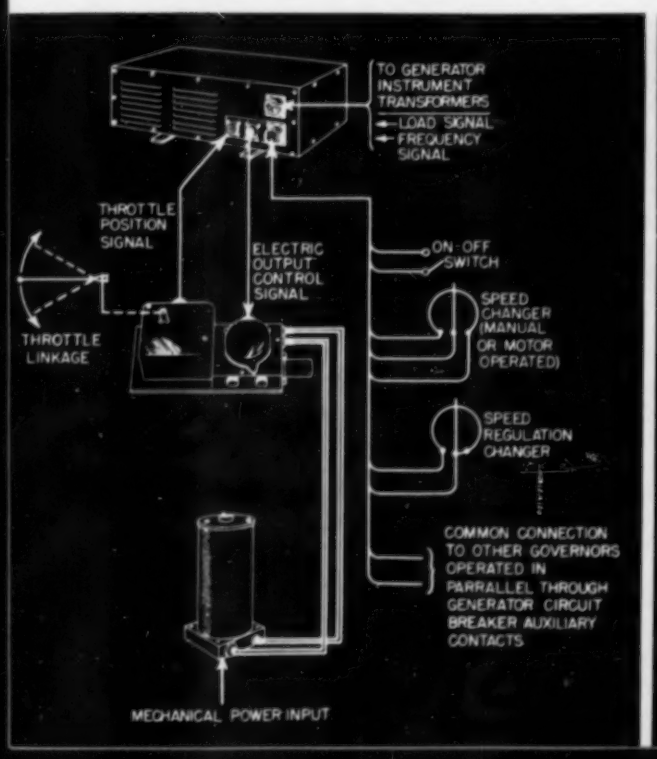

TO GENERATOR INSTRUMENT TRANSFORMERS
LOAD SIGNAL
FREQUENCY SIGNAL
THROTTLE POSITION SIGNAL
ELECTRIC OUTPUT CONTROL SIGNAL
ON-OFF SWITCH
SPEED CHANGER (MANUAL OR MOTOR OPERATED)
THROTTLE LINKAGE
SPEED REGULATION CHANGER
COMMON CONNECTION TO OTHER GOVERNORS OPERATED IN PARRALLEL THROUGH GENERATOR CIRCUIT BREAKER AUXILIARY CONTACTS
MECHANICAL POWER INPUT

Fig. 6: General schematic layout of the new Westinghouse electric governor.

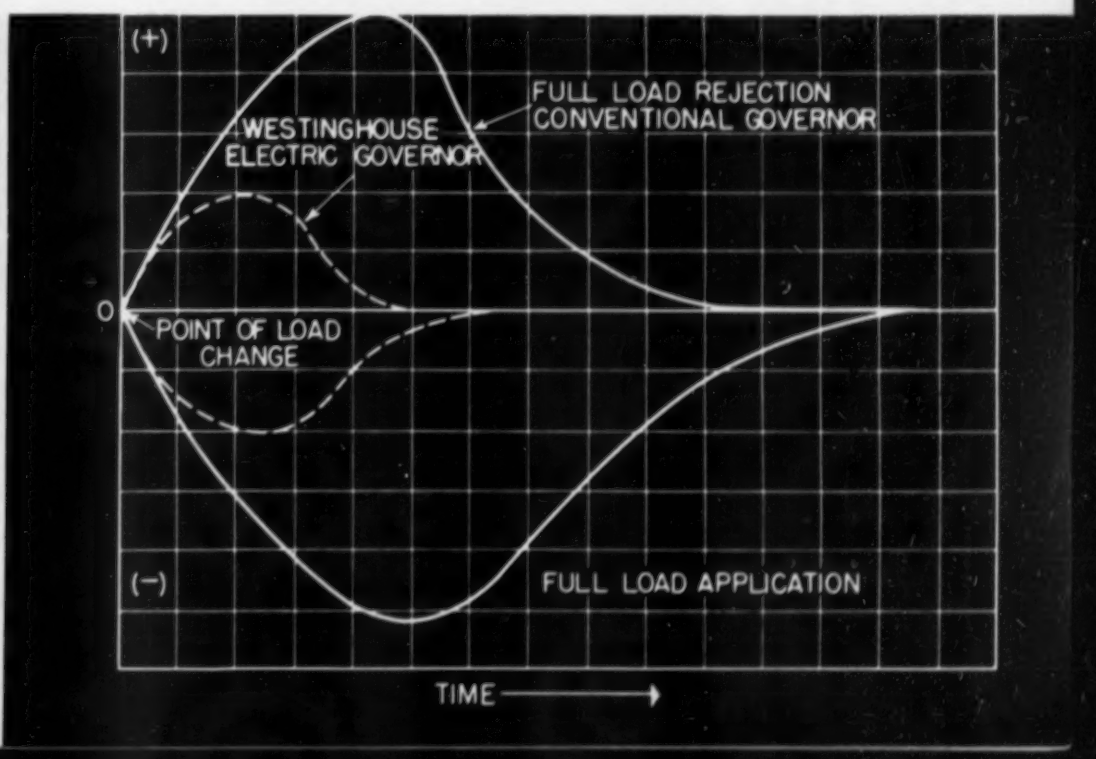
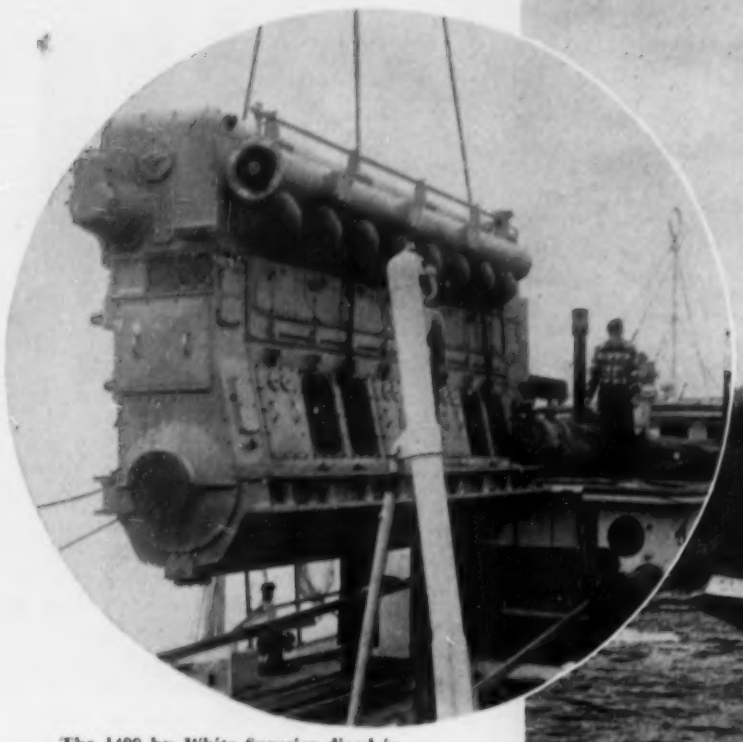
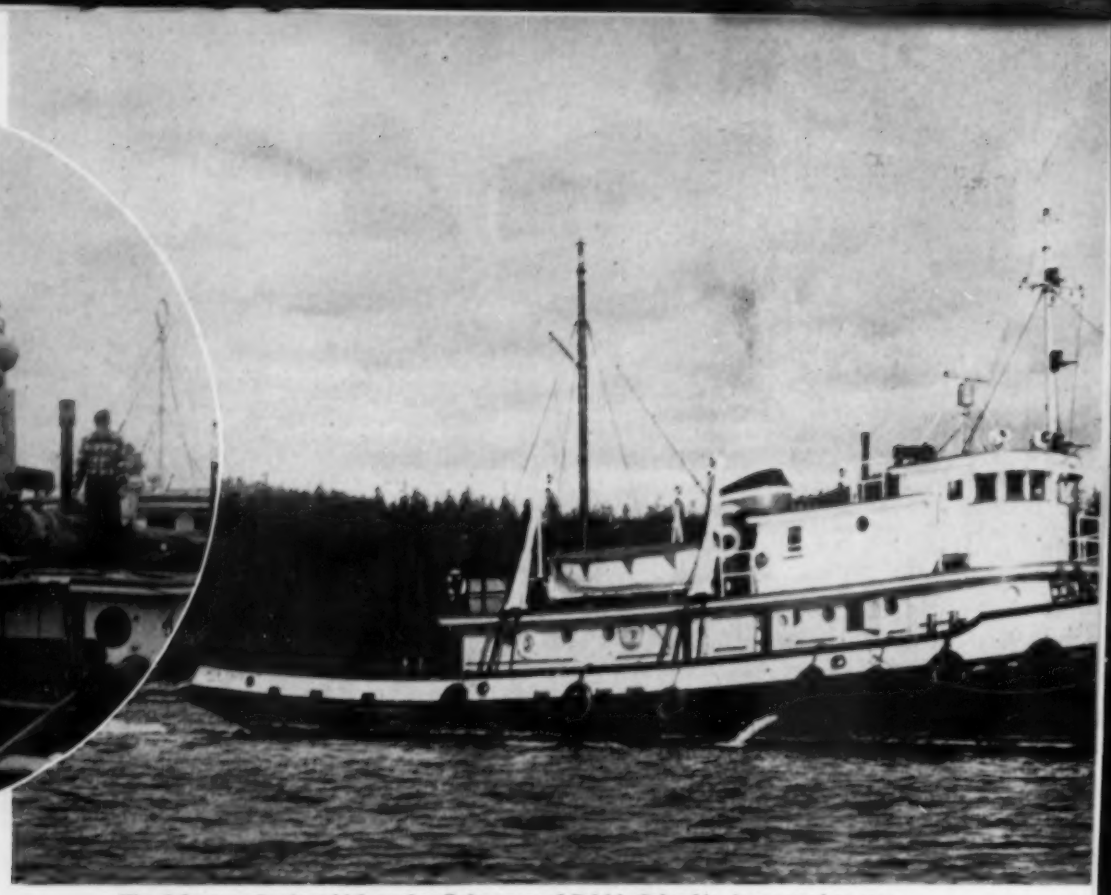


Fig. 1: Diagram showing the comparative speed response of a typical engine-generator set equipped with conventional-type and electric governors.



The 1400 hp White Superior diesel is lowered into the engine room of the *Johnstone Straits*.



The *Johnstone Straits*, which works off the coast of British Columbia, is expected to save almost $22,000 by the time she logs 5,000 hours operating on Bunker fuel.

DIESEL TUG "JOHNSTONE STRAITS"

This Twelve Year Old Tug Has Operated Successfully Since 1955 on Bunker Fuel, Cutting Fuel Costs By More Than 50 Percent.

ONE of the first tugs in history to use Bunker fuel successfully in a diesel engine is cutting fuel costs by more than 50 per cent as she works her way along the rugged British Columbia coast. She's the *Johnstone Straits*, 12-year-old tug operated by Straits Towing Limited of Vancouver. The company expects first year savings to total $21,714 on an estimated 5,000 hours of operation.

The 118-foot tug, built in 1944 by the U.S. Army transportation Corps, earns her keep by towing heavy ore barges and log rafts on a 600-mile run. Key to the tug's successful use of Bunker fuel oil is her year-old, 1400 horsepower Superior diesel engine put into service by the White Diesel Engine Division of the White Motor Company, Ltd., of Vancouver. White Diesel's experience in burning low-cost residuals was applied to the *Johnstone Straits* when it was decided early in 1955 to install an engine using inexpensive Bunker fuel in the tug. John Seagren, chief engineer, and Harvey Hanners, chief research engineer, of White Diesel Engine Division head the company's development of heavy fuel engine operation.

Tests after the first 849 hours of service showed the pistons and liners were exceptionally clean and fuel injection equipment bore no trace of a carbon deposit. The 1400 hp Superior is used to best advantage on the tug by employing an 88-inch propeller with 36/48 inches of pitch which gives full power at minimum slippage. The tug uses Bunker fuel costing 8.1 cents per imperial gallon—53 per cent less than the 17.5 cents a gallon for diesel fuel. The Superior engine has used an average of 66 gallons of fuel an hour under varying loads of the towing service. Savings of 9.4 cents a gallon thus yields hourly cost reductions of $6.20.

By the time the first year of Bunker fuel operation is out late in 1956, Straits Towing estimates the tug will have operated 5,000 hours. However, the Superior diesel actually runs about 70 per cent of the time on heavy fuel, so savings are expected to total $21,714 if the tug logs 5,000 hours. Owing to the loose nature of a log tow, three knots is the maximum speed when the *Johnstone Straits* is underway. As an example of the hard work it performs, the *Johnstone Straits* several times in recent months has turned into Straits "booming grounds" with as many as 111 sections of timber in tow.

With her White Superior diesel, the *Johnstone Straits* has been able to perform a variety of towing jobs. When high winds along the Inland Passage caught her at the log camp, Captain John Bruce used the tug to sort out and make up her own tow, a job usually reserved for smaller vessels. Until the success of the *Johnstone Straits* with Bunker fuel, most operation on Bunker fuel had been confined to large diesel engines of 2,500 to 10,000 hp operating at 100 to 200 rpm. The White Superior diesel is a 350 rpm model 80-M4X-8 direct reversing 1400 hp engine. The Superior's quick-reversing system has given the tug excellent handling characteristics and enables her to achieve quick reversals of direction without a reversing gear.

For any expected prolonged maneuvering, however, the tug operates off her regular diesel fuel tanks. Combustion characteristics of the 14½-inch bore x 20-inch stroke Superior diesel have proved excellent on either fuel.

Fuel available at Vancouver from British-American Oil Company, Ltd., is a medium viscosity residual delivered at dockside to the *Johnstone Straits* at 110 degrees F. The established bunkering practice calls for Straits Towing to notify the oil dock a day ahead of arrival so that enough time is available to heat the oil. In an emergency, only a few hours notice is enough. Analysis of the British American PS 300 mixture shows high carbon and moderate sulfur and ash:

Heavy Fuel Oil Supplied By:
British-American Oil Co., Ltd.
Vancouver, British Columbia

Saybolt Viscosity at 130°F	264 seconds
Saybolt Viscosity at 210°F	64 seconds

additions have been made by Marine Superintendent Robert Preston of Straits Towing.

Mr. Preston recommended the installation of a second oil purifier of 125 gph capacity as a standby for the single 150 gph unit placed in service with the new White engine. He found that the No. 40 weight detergent lubricating oil was doing an effective cleaning job in that it became dirty in 300 hours, using the full flow filtration system that has been successful in regular service. A third centrifuge for the lube oil system proved to be very efficient and compact additional equipment for application to the oil cleaning job. By routine sampling of the lubricating oil Preston makes sure that it is maintaining the necessary composition.

As in any system using residual fuels, care is given to make sure the fuel is heated to flow freely. It is filtered to remove foreign matter. From the filters, the fuel flows to a Sharples oil purifier and the cleaned oil finally is held in a 180-gallon tank in the engine room. A steam boiler with a capacity of 100 pounds per hour at 50 psi gauge supplies heat for the main fuel tanks forward of the engine room. Oil in the two large tanks is maintained at 185 degrees fahrenheit.

The *Johnstone Straits'* original 1225 hp engine was damaged by corrosion as the tug lay idle. Straits Towing used the services of Naval Architect Robert Allan of Vancouver during the conversion of the tug for effective service.

List of Equipment

Engine—Superior model 80-M4X-8 marine diesel, 14½ in. bore x 20 in. stroke, air-reversing engine, operating at 350 rpm and developing 1400 bhp for continuous duty.

Propeller—88 in. diameter by 36/45 in. of pitch.

Turbocharger—Elliott.

Variable speed governor—Woodward Model UG-8.

Fuel oil heaters—Ross.

Fuel oil purifiers—Sharples 1—150 gph capacity. 1—125 gph capacity.

Steam jacketed fuel filter—Winslow.

Jacket water cooler—Ross.

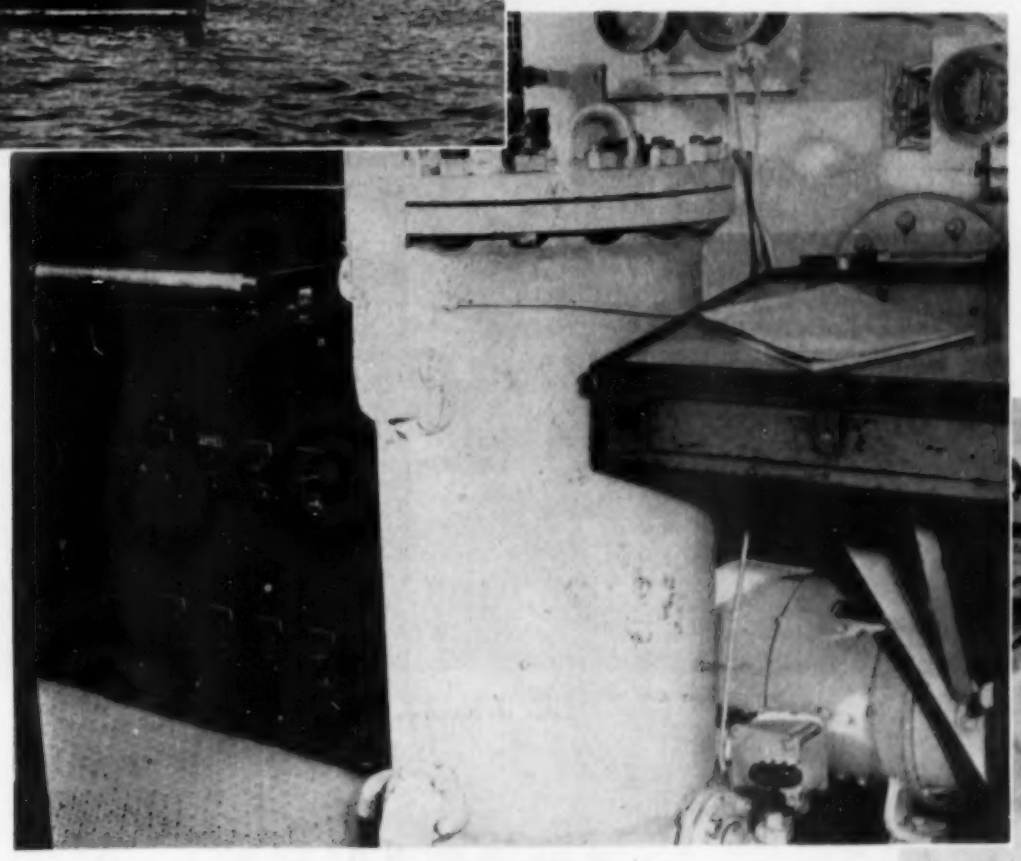
Lubricating oil filter—Purolator.

Lube oil purifier—Sharples (125 gph capacity).

Lube oil cooler—Ross.

Temperature regulators—Fulton-Sylphon.

Thermostat—Amot.



Specific Gravity at 60°F	0.9803
Conradson Carbon	11.07
Ash	.07
Sulfur	0.64
No. 2 Diesel Oil Supplied By:	
Engine Test At	
Springfield, Ohio	
Saybolt Viscosity at 100°F	38 seconds
Specific Gravity at 60°F	0.828 (39.5° Baume)
Conradson Carbon	.002%
Ash	trace
Sulfur	0.10

Since the inspection after 849 hours of service showed excellent results, operation has continued on the same residual fuel. Only a few changes and

The steam-jacketed Winslow fuel filter stands at the forward end of the *Johnstone Straits'* engine room with the engineers' stand and ship's electrical distribution panel.

The ship's telegraph is located within reach of the operating controls of the Model 80-M4X-8 White Superior engine. Note the Ross fuel oil heat exchangers under the ladder behind the second engineer.

"Ripping" to a depth of 8 to 20 inches to show the power of the Case diesel tractor. The units were shown to the Case Company dealers of California for the first time.

The new Case 300 diesel proved popular with the crowd. Here shown on a heavy disc bedmaker, the 300 demonstrates its power.

NEW CASE DIESEL TRACTORS MAKE STOCKTON DEBUT

By F. HAL HIGGINS

THE "Premier Showing" of the J. I. Case Co. line of farm and industrial power machinery at the San Joaquin County Fair grounds just before the holidays was a real indicator of the trend from gasoline to diesel tractor power in the wheel models. For three days, the Case dealers to the number of 235 from five states, plus over 1,100 farmers and 350 4H Club boys and girls took turns in viewing, studying and operating the 25 bright newly designed 1956 models Case is presenting for the 1956 trade. The diesel models drew the crowds and proved that the 75% showing of that type was trending in the direction of the demand of the West at a time when every farmer is looking for cost cutting tools on every crop and operation.

The writer made a special trip over to Stockton to see the Case show. For two main reasons: Stockton is rapidly regaining its pioneer standing as the farm machine capital of the West with International Harvester Co. and Case having factories here and Massey-Harris-Ferguson and Minneapolis-Moline their top branch houses in the West. And Case is not only a farm machine manufacturer with over a century of steady growth and leadership in several lines, but it is a company that has both sent its machines west from the earliest days to fit into our mechanized farming leadership, and has also frequently taken the West's top agricultural engineers back to Racine to introduce the "western influence" into its machines. Stockton for over a half century was the combined harvester capital of the world with as many as six to eight shops and factories turning out this revolutionary machine that finally began sweeping the world outside the Pacific Coast by World War I.

In spite of inclement weather that made one of the three days unpleasant for outdoor activities, farmers on their special day swarmed onto the field rented for demonstrations of plowing, disking, manure spreading, cultivating, harrowing, seeding, etc. The Standard Oil Company of California furnished service to the fleet out at the field near French Camp, a famous old Gold Rush spot. All diesel fuel, gasoline, and all the lubes and greases

tory men to dealers at the Stockton meet: Adjustable front axle with wheels set at any width from 48 to 88 inch tread. New style with a new 2-color coat of yellow body and the famous Indian tribe red that has been Case's color for years. New low orchard model for work under trees. 12-speed transmission to give proper speed to any farm job for top torque engine work. New flexibility for power take-off work. Easy gear shifting. It starts in any gear with no need of clutch slipping or gear clashing. Selective hydraulic controls makes handling one or both cultivator gangs in raising and lowering together or independently. Safety lock hydraulic system with interlocking valves makes it impossible to drop implement when engine is running. Adds safety where children are about.

Other features include double convenience in new hand and foot clutches, starting and stopping tractor by either hand or foot. Added comfort and safety for operator. Case has been one of the leaders in the industry in installing and marking its line of farm machines to reduce accidents to operators and others about operations. Gauges are easily read. New brake has safety for belt and parking while at work. Seat specially designed for comfort and safety. Servicing fast and easy. Side panels and screened grille open wide for easy access. Power-shift for rear wheels to adjust to different jobs like plowing and cultivating made easily in 5 minutes by power shift from seat by tractor operator.

Shown on the floor of the San Joaquin Fair Grounds auditorium are a few of the new Case models which were displayed for a 3-day show for dealers. These tractors were all taken out to a field and demonstrated with the new Case farm implements designed to team with the tractors.

needed were available to keep all the tractors moving at the wishes and whims of dealers, farmers and boys and girls. The 12 forward speeds really gave the kids a thrill and several had to be cautioned about reckless driving over a field being worked by several other tractors with boys and girls operating them and following many other tractor operations.

"The new cushioned-power Case diesel engine is simple and easy to start and operate as a gasoline engine," explained the factory engineers to the dealers, who in turn carried the explanation to visiting farmers the next day. "You just turn the key and it starts directly on diesel fuel, even in winter. You get the diesel economy with smoothly cushioned power, flexible and responsive like that of the 'Case Power-Torq' gas engine. It has the same lugging ability at reduced speeds, too. It's an economical diesel to service and maintain."

Features of the new Case tractors stressed by fac-

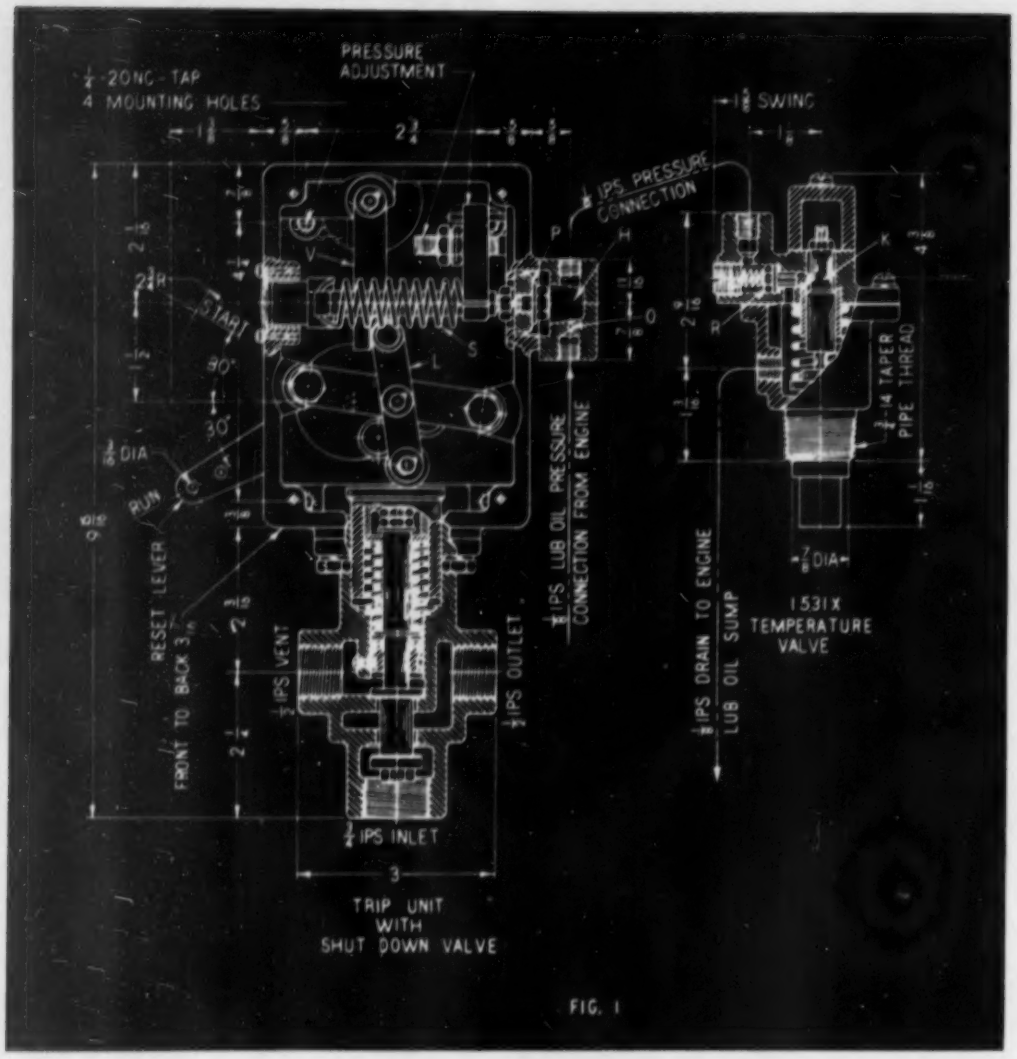
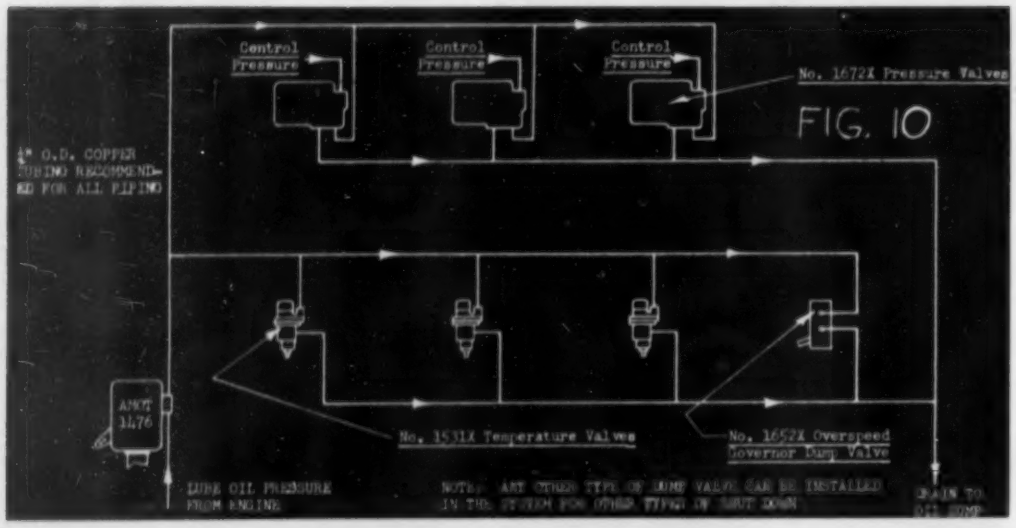


FIG. 1

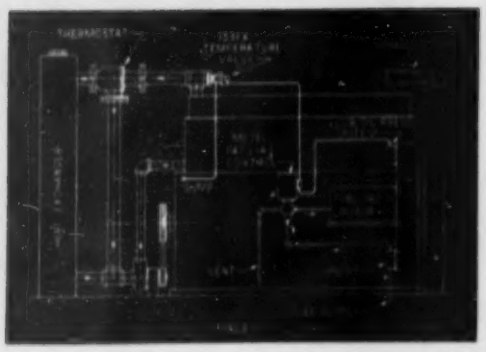

Control Pressure
Control Pressure
Control Pressure
No. 1672X Pressure Valves
FIG. 10
1/4" O.D. COPPER TUBING RECOMMENDED FOR ALL PIPING
AMOT 1476
No. 1531X Temperature Valves
No. 1652X Overspeed Governor Dump Valve
LUBE OIL PRESSURE FROM ENGINE
NOTE: ANY OTHER TYPE OF SHUT DOWN VALVE CAN BE INSTALLED IN THIS SYSTEM FOR OTHER TYPES OF SHUT DOWN
DRAIN TO OIL SUMP

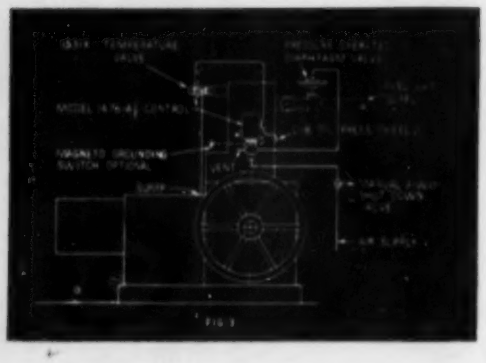
HYDRAULIC SAFETY CONTROL SYSTEM

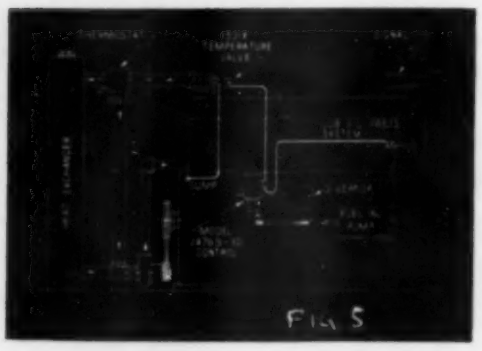
SINCE the introduction a year ago of its Model 1476 Safety Control, Amot Controls Corporation has been working on new models and accessories to produce non-electrical Safety Control Systems that would apply to most types of engine installations, including diesel, natural gas and dual fuel. Besides two new basic control units, accessories are available for the model 1476 control system that will shut down the engine for almost any condition of temperature, pressure or overspeed.

Model 1476A½ and its #1531X temperature valve are shown in Fig. 1. This model is used primarily for shutting down an engine for high jacket water temperature or low oil pressure conditions by shutting off the diesel fuel supply to the injection pump. Fig. 2 shows the piping diagram for this type of installation. Fig. 3 shows how this valve can be installed on a natural gas engine to operate an air operated gas valve. Under operating conditions, the unit supplies air pressure to hold open the air operated gas valve. When the unit trips, the air pressure is cut off and the top of the diaphragm air valve is vented, allowing its spring to close the gas supply. On marine engines and on drilling engines where immediate engine shut down cannot be tolerated, Model 1476A½ can be used to blow an air whistle under danger conditions.

Model 1476B-30 and its 1531X temperature valve are shown in Fig. 4. This control uses the same trip box, but is supplied with a mechanical operator lever that is capable of producing a torque of 30 inch pounds. This control can be used to cause immediate diesel engine shut down by mechanically pulling the fuel pump rack to the "no fuel" position when tripped. Fig. 5 shows the installation diagram. Fig. 6 shows one design of the linkage so that the unit does not have to overcome the entire







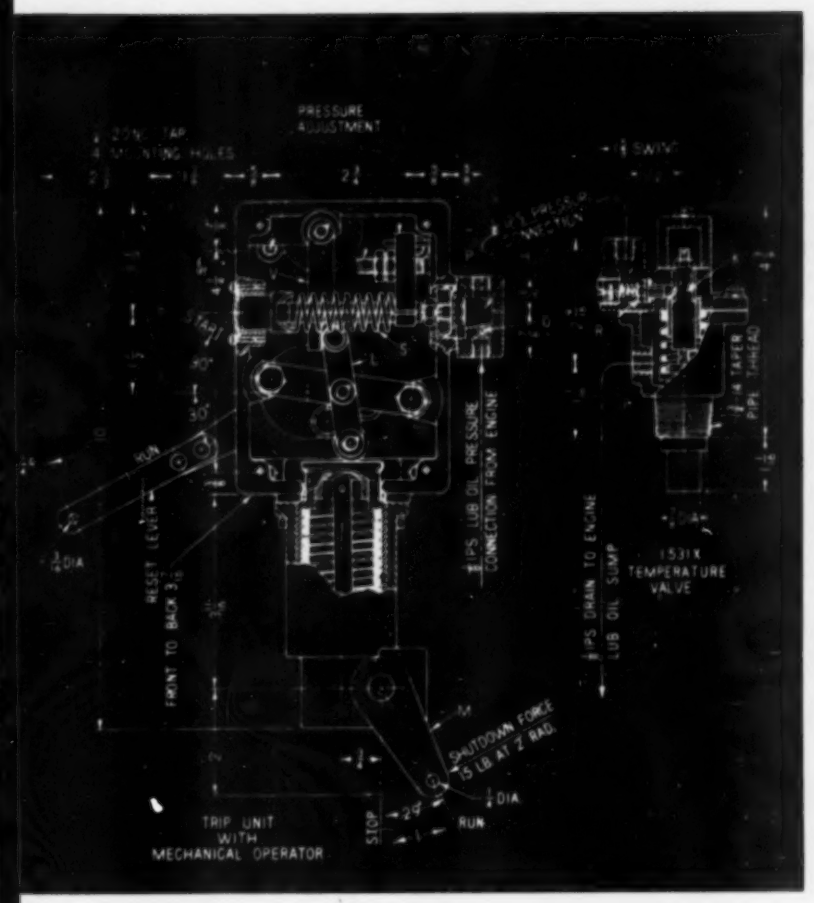


FIG. 4

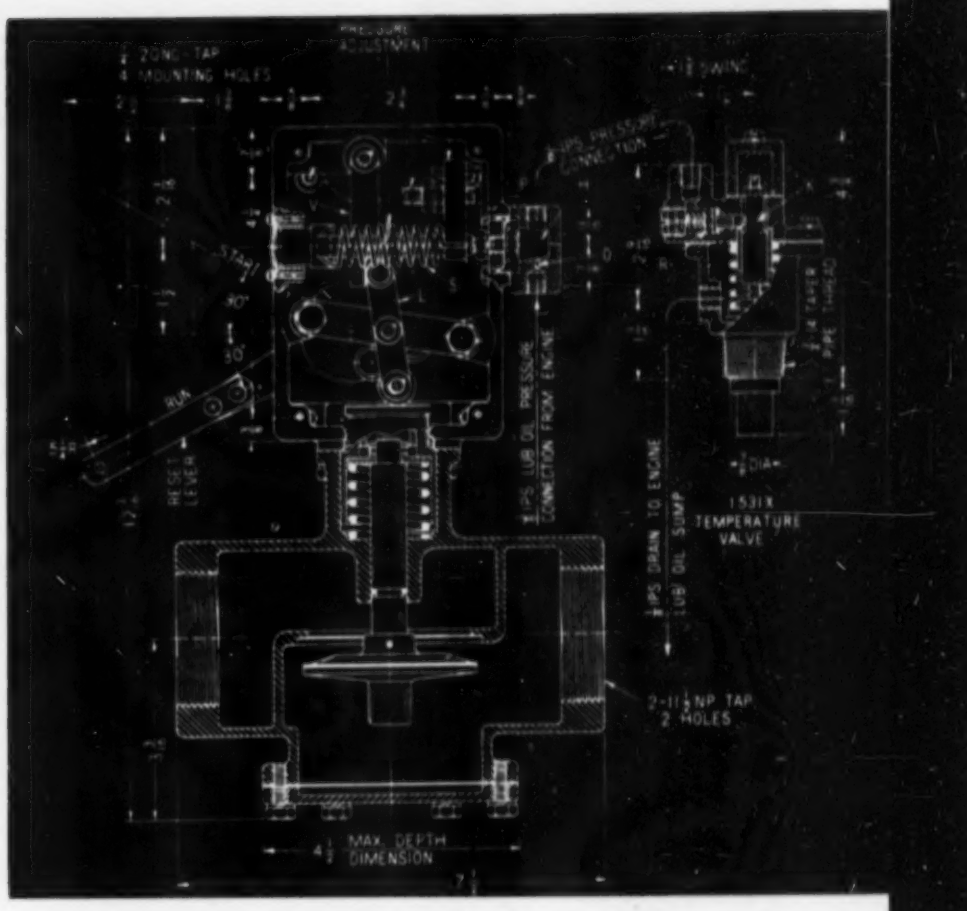


FIG. 7

governor spring force when it trips. This model is ideal for shutting off engines like General Motors that are equipped with a flapper valve or butterfly valve in the intake manifold for emergency shut down. A kit is available for applying Model 1476B-30 to General Motors diesel engines.

Model 1476C2 and its 1531X temperature valve are shown in Fig. 7. This model uses the same trip box as the other models, but is equipped with a 2 in. gas valve directly connected to it. The unit shuts down natural gas or dual fuel engines. This valve eliminates the possibility of explosions, if the engine is shut down by means of this gas valve instead of by grounding the magneto on natural gas engines. Fig. 8 shows the installation diagram for natural gas engines, and Fig. 9 shows one type of installation on dual fuel engines.

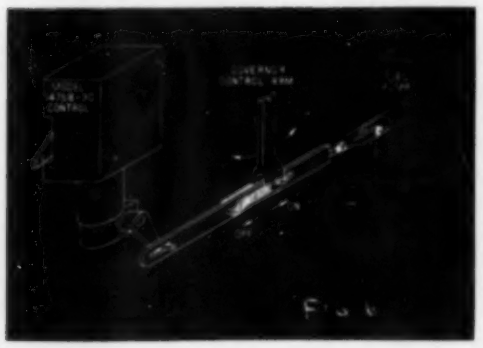
All three basic models are available with certain modifications. When starting an engine equipped with one of the model 1476 units, the operator normally must hold the reset lever up until the engine has started. If this procedure is awkward, as it sometimes is on starting a large 2 cycle engine, the reset latch modification can be ordered. With the reset latch modification, the trip box will automatically release the latch when the engine has started and the oil pressure has come up to normal. An overspeed governor lever modification is also available for attachment to the engine overspeed governor for overspeed shut down.

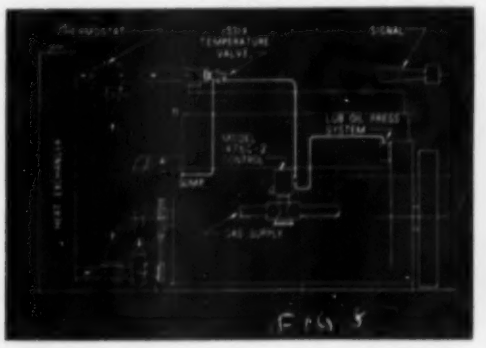
Micro Switches are also available to sound an alarm when shut down has occurred. Accessories include #1531X temperature valves, #1652 overspeed dump valve, and #1672X pressure valves. Fig. 10 shows a piping diagram with all of these accessories, in the 1476 control system. If any single accessory in Fig. 10 operates, the engine will shut down. #1652X overspeed dump valve is attached to the overspeed governor. On overspeed conditions, governor operates a linkage causing this valve to dump lube oil pressure, shutting down engine.

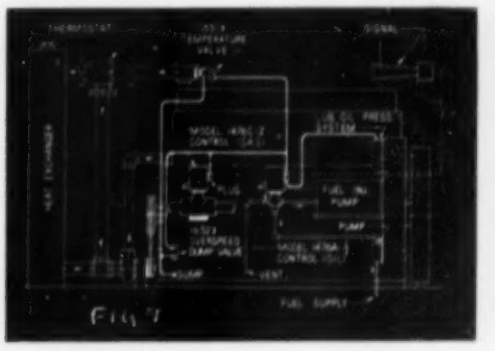
#1531 temperature valve will dump the lube oil pressure when a predetermined temperature is reached, which shuts down the engine. #1672X pressure valve will dump the lube oil pressure under a predetermined pressure condition and can be ordered to dump on either rising pressure or falling pressure. This valve can be used for shutting down the engine or changing back from dual fuel to diesel fuel under many conditions, i.e., low fuel pressure, low gas pressure, high compressor pressure, low suction pressure, low water pressure, high turbocharger manifold pressure, etc.

On the piping for the model 1476 control system ¼ in. O.D. copper tubing is recommended for all lines. Any break or leak in these lines will release the pressure and cause shut down of the engine.

When any sensing valve dumps, the pressure in chamber "H" in Fig. 1 is immediately reduced because the oil will drain from this chamber faster than it can be replaced through orifice "O." This causes spring "S" to pull piston "P" to the right, pushing vertical link "V" and overcenter linkage "L" to the right. This releases the plunger and it moves upwards by its spring force, thus causing the engine to shut down.







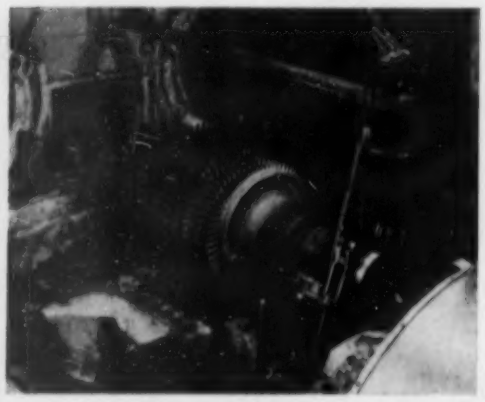
WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **BERNARD W. LANSDOWNE**

Bernard W. Lansdowne is an associate member of the Institution of Mechanical Engineers and is widely known among British and European diesel manufacturers as editor of our English contemporary "Gas & Oil Power." His early workshop training was spread over seven years with A.E.C., Ltd., Southall, following which he served some five years with that company's sales engineering department. He entered technical journalism as assistant editor of "Gas & Oil Power" in 1950 and was appointed editor in 1952.

Successful Service From Sea-Going Gas Turbine

THE 12,000 ton oil tanker *Auris*, one of the Shell fleet, is now famous as the first sea-going merchant ship to be fitted with a gas turbine main propulsion unit. Her original machinery comprised four 830 kva Hawthorn-Sulzer–B.T.H. diesel alternator sets, and in 1951 one of these was removed and replaced by a 1,200 bhp British Thomson-Houston gas turbine. The *Auris* is now at Barry, South Wales, where the hp section of the turbine has been opened up for inspection. Since it was installed the gas turbine has run at full power for 17,510 hours and the condition in which it has been found during inspection justifies the claim that the problem of corrosion has been overcome and that the problem of de-position when a turbine is operating on all grades of commercial boiler fuels is well on the way to solution.



Gas turbine rotor being lifted out of casing on the oil tanker *Auris* for inspection.

Boiler oil is cheaper and more readily available than diesel fuel but there are, of course, two major problems in connection with the operation of a marine gas turbine on the heavier grades, namely corrosion and fouling. During the first three years of service with the B.T.H. gas turbine in the *Auris* it was necessary to operate it for a proportion of the time on diesel fuel, but for some time now only boiler fuel has been used, with encouraging results. About a year ago in Lisbon the high-pressure section of the turbine was inspected and since that time the turbine has consumed 500 tons of boiler oil with viscosity varying from 1,200 to 1,500 sec. Redwood 1, at 100 degrees F. The recent inspection at Barry has shown that it is today just as clean as on leaving Lisbon a year ago.

The use of special materials has prevented the corrosion of components which operate at a red heat, and accumulation of deposits on blades has been prevented by a new technique which removes the combustion deposits as they occur. The *Auris* installation, in addition to the high-pressure turbine, incorporates an air compressor, a heat exchanger and a low-pressure turbine, none of which have had to be opened up for cleaning. Salt from sea spray drawn into the compressor has been removed by water injection and steam jets are used to prevent the formation of soot on the heat exchanger tubes. Wear on the shaft journals and thrust bearings, the most vulnerable components in the installation, has been found to be negligible and the attraction of this form of ship propulsion no longer seems to be in doubt.

When the *Auris* next goes into service she will be fitted with a new British Thomson-Houston, 5,500 hp gas turbine to the total exclusion of its existing propulsion machinery. B.T.H. are confident that the ship will then have a fuel economy comparable to a steam turbine and will be able to operate on the same low-priced fuels with, at the same time, much lower maintenance costs. In the new all-gas turbine installation the drive to the propeller will be through gearing.

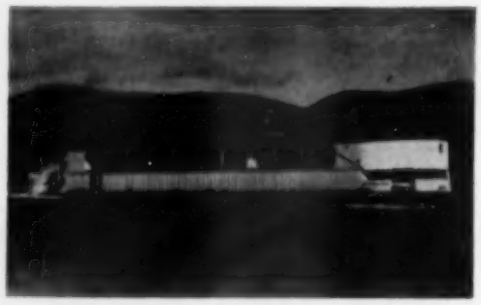
SHALLOW-DRAFT PADDLE VESSELS FOR BURMA

The first of five quarter-wheeler dieselized paddle vessels under construction by Yarrow & Co., Glasgow, has now carried out its trials. Known as the *Pondaung* it is being built, together with four sister vessels, the *Ponnya*, *Padashin*, *Padamya* and *Padapyan* for the Inland Water Transport Board of Burma. They will be used for cargo and passenger transport on inland waterways operated by the Board. Stern paddle wheels on each quarter propel the craft with an eight-cylinder National diesel engine as prime mover.

The design is to the requirements of Lloyd's Register and the vessels have the following principal characteristics:

Length overall	148 ft. 6 in.
Moulded breadth	34 ft.
Moulded depth	5 ft. 6 in.
Draft, loaded	4 ft.
Deadweight capacity	170 tons
Passengers	310
Speed on trial	11 mph
Power	390 bhp

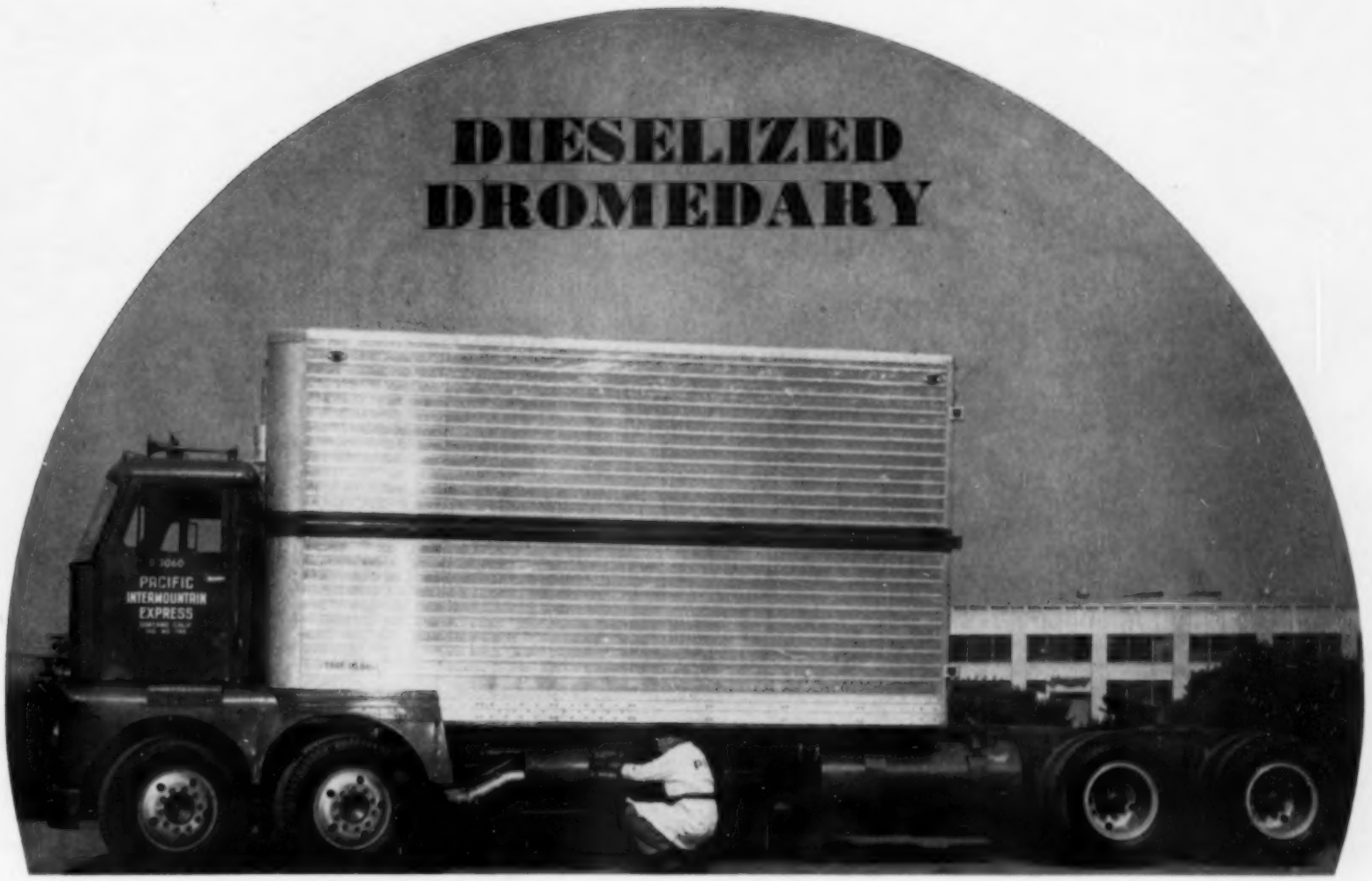
The eight-cylinder National diesel is of the R4AM8 four-stroke type with cylinder dimensions of 9 in. by 12 in. It is rated 440 bhp at 600 rpm and drives the paddle wheels through a Vulcan Sinclair fluid coupling, a Modern Wheel Drive oil-operated reverse-reduction gear and a David Brown Radicon worm reduction gear. The main engine is fresh water cooled by a heat exchanger and has fresh water, river water, fuel oil, lubricating oil and bilge pumps driven from the engine.



The Motor Vessel *Pondaung*.

The Vulcan Sinclair coupling is of the size 41 scoop control type with a slip of approximately 2½ percent, this form of power transmission being ideally suited to diesel river craft because they protect the engine from shock and damage if the paddles strike a sandbank or floating obstruction. The stern paddles are constructed as two separate wheels each supported in two bearings and fitted with feathering gear operated by an eccentric, carried on brackets attached to the hull structure. The vessels are required to navigate in very restricted waters and to facilitate this four rudders operated by hand-powered steering gear are provided.

DIESELIZED DROMEDARY



Turbocharged Cummins located beneath the dromedary box, not under driver. Note, too, the dual-front-axles. Both turn when rig turns. All four tractor axles ride on air springs.

By **JAMES JOSEPH**

WHEN, last spring, PIE's experimental tractor XD-30 first took to western highways, many a trucker thought he was seeing double. And, in fact, he was. For XD-30 steered using four front wheels instead of two—first U.S. over-the-road tractor steered by dual front tandem axles. Steering wasn't the tractor's only oddity. Tucked beneath its dromedary box was a pancake Cummins NHHT, turbocharged to 250 hp, the engine located aft of the driver, not under him, as in most big rigs. Under-box location isolated both vibration and noise from the cab, allowed a shorter cab thus longer, bigger capacitied dromedary box. PIE's gain: a dromedary that's 17 ft. long, 5 ft. 6 in. longer than "standard," able to haul a bonus 4000-lbs. cargo.

XD-30 rode literally on air, both front and rear axle assemblies cushioned on air springs . . . first tractor totally air-suspended. Air-ride allows for a higher box (because both dromedary and trailer maintain constant height, whether loaded or empty). Additionally, PIE looks for sizable reductions in maintenance . . . and smoother riding for such fragile freight as electronic gear and an easier ride for the driver. Now, with a year and 75,000-miles behind it, XD-30 is being proclaimed "a driver's dream," and 20 similar tractors are already in production at Kenworth's Seattle plant.

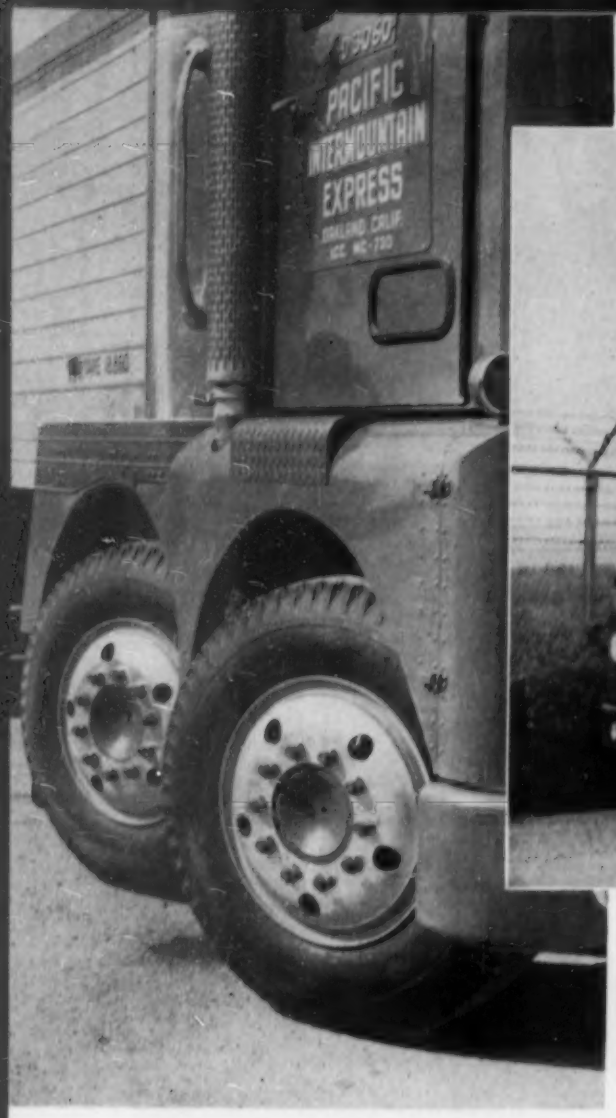
Says PIE's Charles Palin, who's v-p of transportation and properties, "XD-30, designed and fabricated in our Denver shops, isn't 'experimental' anymore. She has proved herself and is probably the smoothest tractor in operation."

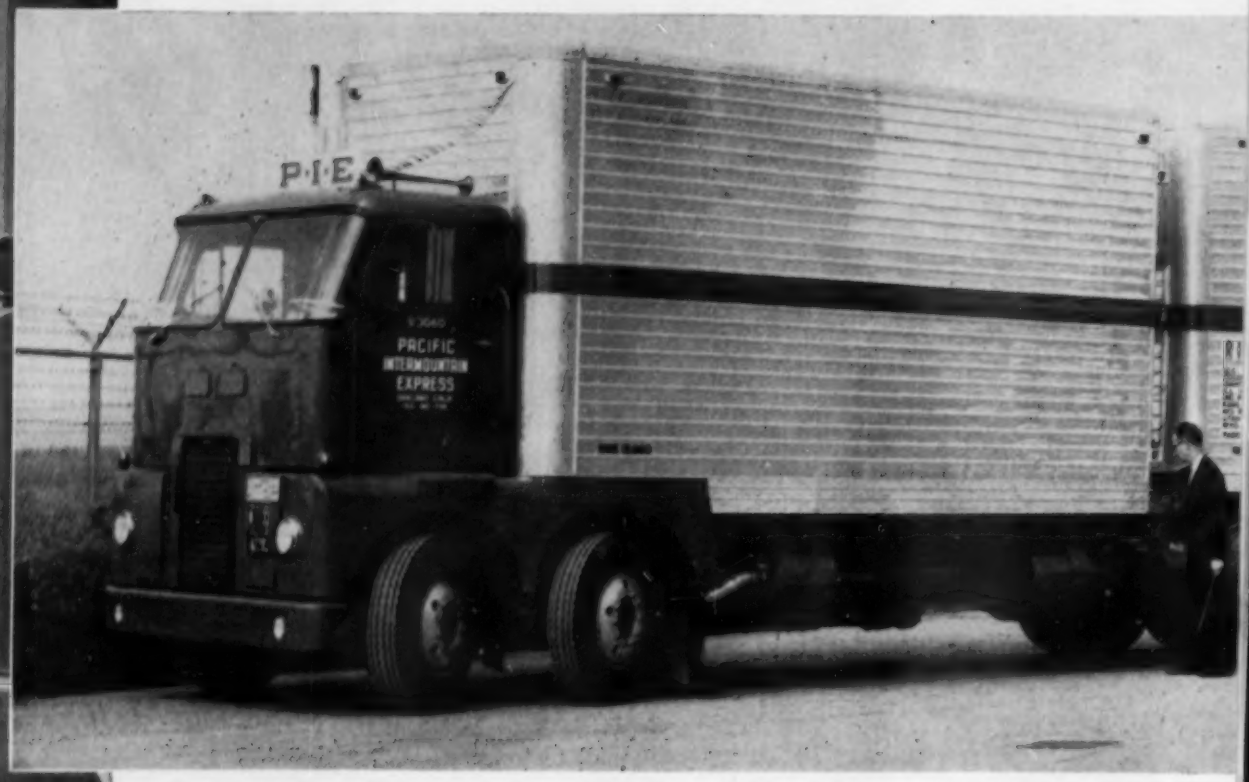
The concept: ever since PIE introduced the dromdary as a hedge against fluctuating length-weight laws, its engineers have been toying with the idea of shortening cab length, increasing both length and cargo capacity of the dromedary. But there were problems aplenty. With tractors steel-spring suspended, designers had to allow for "empty height"—approximately four inches difference between loaded and unloaded condition. In 1954, PIE equipped its entire fleet of van-type trailers with air springs. Advantage of air-springs stems from fact that the springs inflate-deflate automatically, depending on the load. Thus, rig height remains constant, regardless of load. But PIE rear tractor axles—which carried the trailer's fifth wheel—hadn't been air-suspended until the XD-30.

Secondly, in-cab engine location, and especially the usual vertical engine, necessitated a longer cab, thus shorter dromedary. In the XD-30, PIE pulled a switch, adapted the "pancake" horizontal diesel, specifically Cummins' pancake, turbocharged NHHT. Engine has a number of advantages: better weight distribution, out-of-cab location, easier access for maintenance. Dual front tandem axles seemed to demand power steering, something PIE wanted to avoid if possible. Designers got around that one nicely by adapting Page & Page's center-line front axles. Center-line design, its better load-to-tire distribution, makes XD-30 one of the easiest steering rigs—without resort to power steering. PIE figures tire life will also be increased, because center-line design requires no camber in axles, distributes wear evenly across tread's width. Tires roll freer, don't scuff. Currently, PIE is applying for patents on its front-axle design, which it believes heftier, more roadable than present systems.

Another matter is safety. With four wheels up front, blow-out of one tire has little effect upon the rig's control. Besides, for PIE's western winter routes over high passes, the four-tire front gives more skid resistance on ice, snow and wet pavements.

Radiator: with XD-30's diesel engine mounted some 8-feet behind the cab, cooling called for some astute engineering. Go and return lines, carrying the diesel's engine jacket water to the cab's radiator, are 2-inch dia. flexible tubing. The big problem: how to drive the fan? Originally, PIE hooked an





Close-up of dual-front axles.

electric motor to the standard fan, drove it from the tractor's generator. But the load proved too heavy. So XD-30 was installed (as are subsequent units) with a hydraulic motor, thermostatically controlled. Result: whereas in-line engine fans operate continually when the engine's running, XD-30's fan works only about 10 per cent of the time. Radiator coils are large enough to cool engine jacket water over most runs . . . without the fan. Only when tractor's pulling uphill or idling in-town does engine temperature signal the fan's hydraulically-powered motor. Result: less wear, less maintenance and solution to what might have been a serious major trouble spot.

Up-front radiator location is unusual in itself when hooked to a pancake diesel. More commonly, the radiator is mounted near the engine, taking air one side of the tractor or the other. PIE's front end location was dictated for several reasons: (1) radiator stays cleaner up-front than when located beneath the rig; (2) up-front location maximizes radiator's cooling ability and in XD-30's case, means the fan works only a fraction of the time. Relatively long-runs cooling lines haven't given trouble and PIE doesn't expect them to.

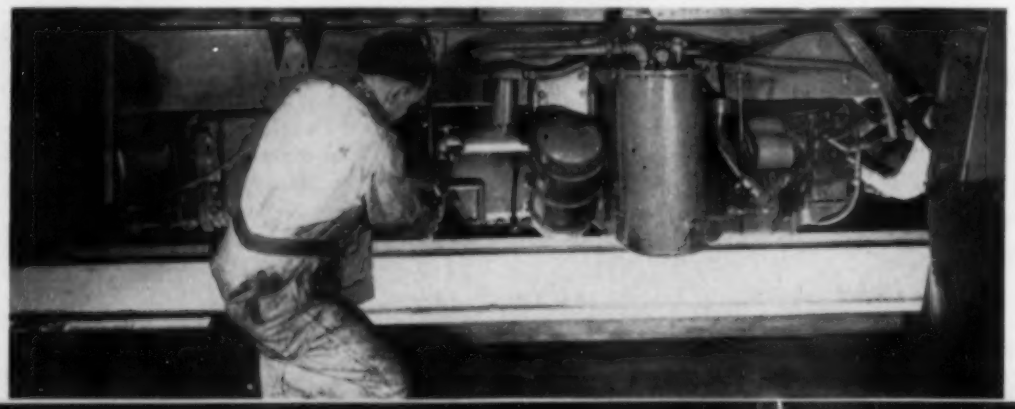
Weight reduction: XD-30 slices some 750-lbs. off tractor weight, significant when you consider that at the same time, PIE added another 6-ft. to its dromedary box. Cab is lighter because dimensionally it's shallower, lower (9-ft. off the ground), and only 7 ft. 6 in. wide. Also, cab is mounted on "stilts," rather than on a heavy inset frame. With engine isolated from cab, framing can be lighter, insulation less, because heat and vibration aren't bothersome. Tractor's rear hubs are aluminum, though not its four front hubs. Air springs, particularly the rear assembly, cut about 1500-lbs. from rig weight. But much of this is picked up again in the heavier front-end assembly. The horizontal engine and its turbocharger add about 150-lbs. over more "standard" engines. Yet over-all reductions add to 750-lbs., giving that much more payload.

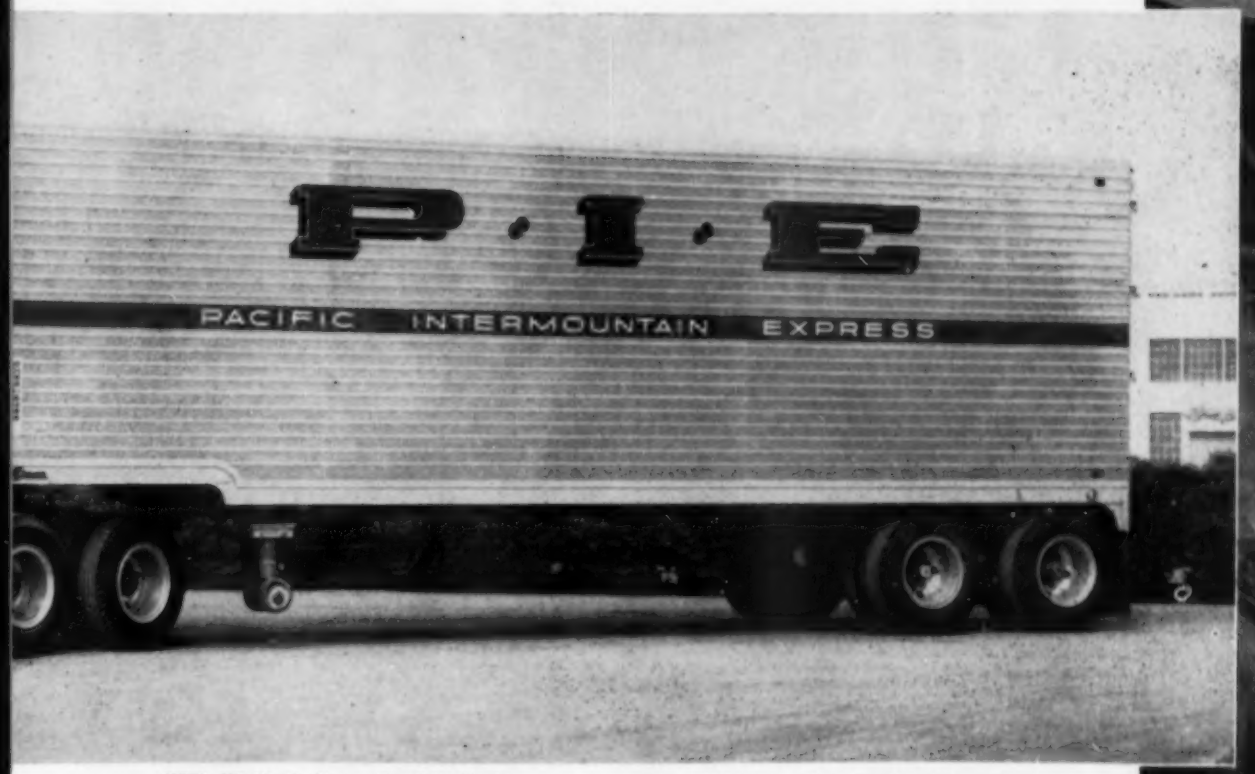
The Engine: The Cummins' "pancake" NHHT, turbocharged to 250 hp, has 6-cylinders, a 743 cu. in. displacement, a bore of 5½, a stroke of 6-in. Turbocharging boosts hp from rated 200 hp at 2100 rpm, to 250 hp. Physically, the NHHT is mounted 8-ft. behind the driver, and above the axles, with road clearance held to about 16-inches. XD-30's road clearance is the same as on PIE's other more standard diesel tractors. Engine's underside is protected by a light steel pan. Exhaust, via the turbocharger, runs to a conventional stack and muffler extending up the cab's right side. PIE, admittedly, could have run engine's exhaust up the dromedary. But Denver-shop engineers stuck to conventional placement, and for two reasons: (1) most PIE shop facilities are designed to service tractors with exhausts on the cab's right side; (2) with the power plant located far back of the cab, drivers need some gauge of engine behavior and the nearby exhaust becomes a kind of performance indicator. For practically negligible are in-cab fumes, vibration, noise and heat.

Controls: the prototype XD-30 and its now-abuilding sisters are equipped with manual shifting, a 10-speed direct Fuller Roadranger transmission. Clutch and throttle, both hydraulic, operate from the same 1-quart cylinder mounted on the dash. A 10-gallon reserve tank operates the radiator's fan-motor. Fuel: tractor carries a single, 100-gallon fuel tank on rig's left side, behind the diesel. Gallonage is sufficient to carry rig between PIE's division points, spaced 260-300 miles apart.

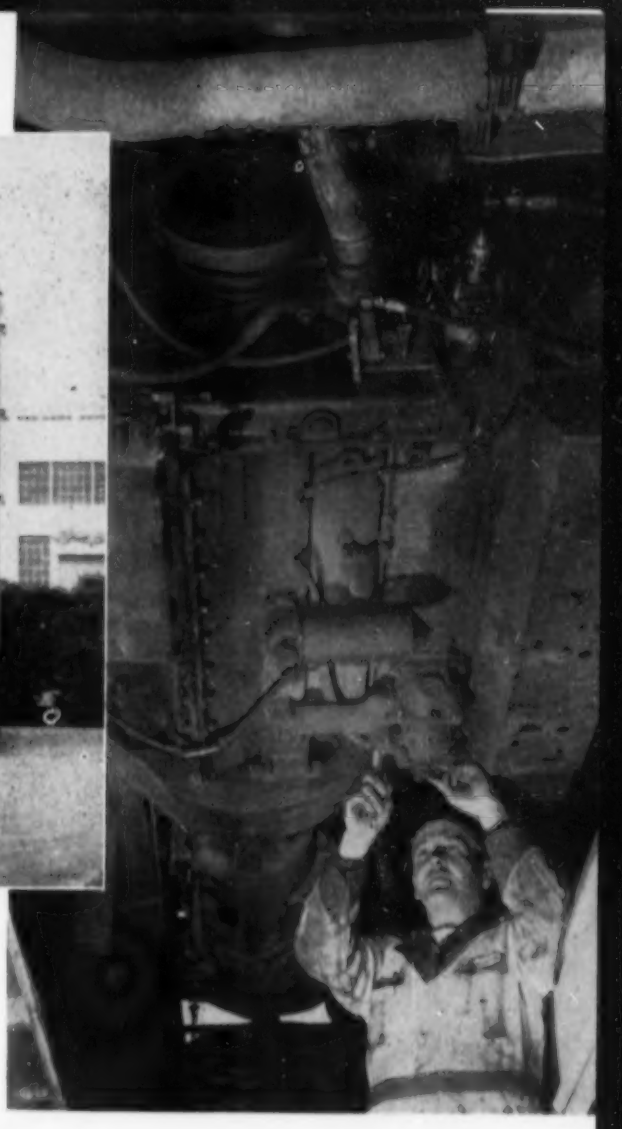
Loading: big advantage of the 4-axle tractor is loading flexibility. Previously, every pound in the trailer tended to "unload" the front end. Loading became critical, a difficult and galling job what with

Maintenance men don't have to work from pit—nor tilt-up cab—to get at Cummins pancake, the XD-30's power plant.





PIE's XD-30—similar to 20 of its kind now abuilding. Bonus 6-ft. length for the dromedary, thanks to under-dromedary placement of pancake engine.



XD-30's pancake Cummins from maintenance pit . . . "an easy engine to get at," say mechanics.

axle-load limits varying state-to-state. XD-30's front end is practically independent of trailer load. Even an empty trailer has little or no effect upon the front axle, nor upon the dromedary. PIE says that not only is loading far easier, far less critical but dromedary and trailer can be full-loaded with no risk of over-legal axle-weight. For one thing, the fifth wheel, formerly mounted 12-inches back of the bogey's center, is now located over the bogey centerline. As for the tractor's rear-end, it's a conventional Timken SQW-3458. Rear wheels have but slight camber. Tires over-all are PIE fleet "standard," 10.320s, minimizing service problems.

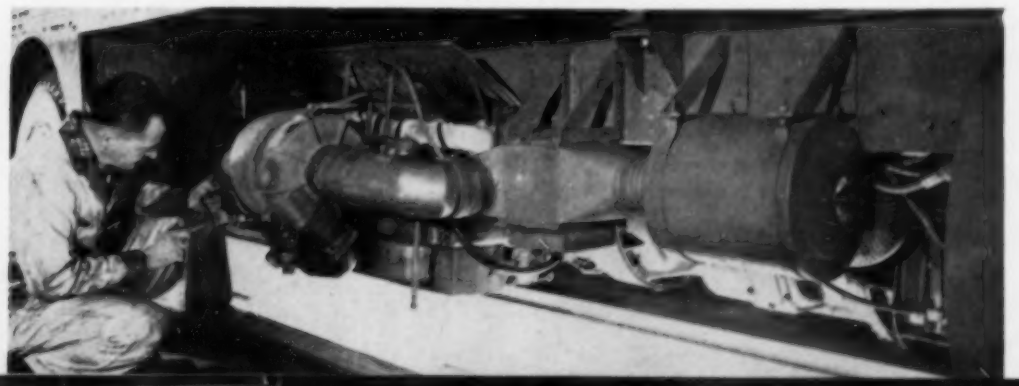
Assistant Director of Fleet Maintenance Harry Gray points to the pancake diesel's accessibility. "Engine," he explains, "can be 'dropped out,' rather than hoisted, as with more conventional types. And, of course, mechanics can get at head and pistons from the side, from ground level. Everything that pulls is below frame level. To pull an engine you need only a couple of jacks. We'll drop the engine out the bottom, onto a dolly. It's going to simplify maintenance."

Air Springs: originally, both XD-30's front axles rode the same air spring. That is, two airbags, one either side of the cab, suspended the tandem axles.

Now, however, four air-bags have outdated this older set-up. Each axle and each end of the axle rides its separate air-bag (as does the rear assembly). Air-bags are inflated-deflated automatically via leveling valves, these weight-actuated, the air taken from the rig's air-brake reserve tank. However, there's an automatic cut-off. Should an air bag burst, threatening to drain the brake reserve tank, a valve closes, holding air reserves to safe levels (60 psi). With rig empty, springs are pressured with but 4-lbs. of air; loaded, with 45-lbs.

During the past two years, and operating some 700 air-suspended rigs, PIE reports only three bag casualties, these torn loose in accidents. But even if a bag bursts, there's a built-in rubber cushion on which the axles ride, enough to get the rig into a PIE division garage. Built-in, too, is "delayed leveling." Point is to maintain constant rig height, yet level out road bumps, shock or sway.

"Side door" maintenance . . . is how PIE mechanics term the ease at getting to the Cummins pancake diesel. Note Elliott turbocharger. Radiator fan is isolated, operates independently.



Driver's Viewpoint: drivers who've test-run the XD-30 are loud in the unit's praise. Fatigue, they say, is greatly reduced over long western runs (rigs will operate Denver west). Steering is "feather-touch." "No strain . . . easier riding . . . best I've ever handled," is how one long-term driver puts it. Tractor has full-vision wrap-around windshield. L. H. Peterson headed the design group under direction of J. W. Riesing, director of Maintenance.

Credits:

XD-30 prototype: Pacific Intermountain Express.

XD-30 production models: Kenworth.

Engine: Cummins (NHHT)

Front Steering: Page & Page Co., Portland, Ore.

Air Springs: General Tire and Rubber Co.

Transmission: Fuller Roadranger.

Engine exhaust: John Heinrich & Co., Sacramento.

Engine turbocharger: Elliott.

Air cleaner: Purolator (dry type).

Engine oil cleaner: Luberfiner (750C).

AUTOMOTIVE DIESEL PROGRESS

A COMMENTARY BY MERRILL C. HORINE

Merrill C. Horine, for 38 years a member of the Society of Automotive Engineers, has been actively engaged in automotive engineering, sales promotion and training, advertising and editing of automotive publications since 1907. He has contributed numerous papers on diesel and allied subjects to the SAE and other organizations. An officer in the Air Service in World War I, he was a consultant to the Chief of Ordnance and the Automotive Division of the War Production Board in World War II.

Anomalies in Horsepower Ratings

DIRECT comparison between horsepower ratings of gasoline and diesel engines are deceptive, since, according to the standard procedure prescribed by the Society of Automotive Engineers, the same actual output results in a rating of the diesel 2 per cent lower than the gasoline engine. This anomaly arises from the correction factors employed. Correction factors are necessary in rating engine output because the actual torque and horsepower observed in a dynamometer test will vary slightly according to the barometric pressure, the relative humidity and the intake air temperature existing at the time the test is run.

An internal combustion engine converts the latent energy of the fuel into active mechanical power through the process of burning, which raises the temperature of the air in the combustion chamber and correspondingly its pressure. The amount of heat and the corresponding pressure thus produced is dependent upon how much and how efficiently the fuel is burned. This, in turn, is governed by the amount of oxygen present. Three factors determine the relative proportion of oxygen in the air, namely, temperature, barometric pressure and relative humidity. Cooler air contains more oxygen per volume, as does air under high barometric pressure and low humidity.

Accordingly, under conditions exactly similar in other respects, an engine will show greater output with cool intake air, at sea level and dry than with warm, humid air, at high altitude or low barometric reading. For purposes of rating, therefore, these variables must be compensated for by establishing a standard or normal value for each and correcting the observed performance readings.

So far, so good. Many years ago, correction factors for gasoline engines were agreed upon and adopted by the SAE, namely,

60 deg. F. intake air temperature
29.92 Hg. Barometer reading
O relative humidity

The fact that these do not represent normal operating conditions was not regarded as important, since the purpose was merely to bring variable observed readings to a common standard. At that time the automotive diesel did not exist. Similar standards were set up for diesel engine testing by the Diesel Engine Mfrs. Assn., based upon what was assumed to be normal operating conditions for stationary diesel generating plants. They differed from the gasoline engine correction factors in that the temperature was taken at 90 degrees and barometer at 30.2 Hg., with relative humidity at zero.

These factors were later adopted for diesel engines by the SAE. The differences between the two standards is enough to produce corrected ratings, from the same observed outputs, 2 per cent higher for gasoline than for diesel engines. That these factors are most unrealistic is everywhere recognized. Under-hood temperatures of automotive vehicles are rarely under 90 degrees and often rise to close to 200 at the top of the hood, where the air cleaner intake is most frequently located. The barometric pressure assumed for diesels seems quite normal for regions between sea level and perhaps 500 feet altitude, so that here the gasoline factor is the more representative. Zero relative humidity is obviously abnormal.

From a commonsense standpoint, it would seem that if there were to be any difference in the correction factors as between gasoline and diesel engines, the air temperature assumed for the diesel should be lower, not higher than for the gasoline engine, since the former rejects less heat both to the coolant and the exhaust. Numerous attempts have been made to reconcile the contradictions present in this situation; but so far without result. The automotive coterie is reluctant to change, say from 60 deg. F. to the diesel's 90 deg. F., not because this change would reduce the corrected ratings by 2 per cent, but because it would entail a vast amount of alteration of established procedure.

Similarly the diesel industry is quite unwilling to adopt the unrealistic temperature of 60 deg. F. as a basis for correction. The 90-degree factor, as a matter of fact, would seem reasonably close to normal for stationary and marine installations; though much too cool for automotive and railway service. Marine operations are mostly at sea level, of course. In settling upon formulas and data for vehicle performance prediction, it has been necessary for the SAE and others to calculate horsepower and torque requirements for given performance upon the basis of ratings based on SAE correction factors. Without doubt, owing to the slight over-rating involved, true horsepower requirements are less than assumed, so that if a more realistic set of correction factors were adopted, these performance formulas would require corresponding revision.

In the meantime the margin between diesel and gasoline rating works to the advantage of the diesel, since such corrections tend to understate the actual performance capabilities of diesel vehicles.

So far, no official recognition of this fact has been accorded; but it is the practice of some to raise the horsepower assumed for automotive diesels 2 per cent above their corrected and certified ratings in making vehicle performance calculations.

FORMULAS FOR CORRECTED HP BY SAE STANDARD TEST CODES

For gasoline engines:

$$BHPc = (BHPo - FHP) \times \frac{29.92}{B - VP} \times \frac{460/AT}{520} = FHP$$

For diesel engines:

$$BHPc = (BHPo - FHP) \times \frac{30.2}{B - VP} \times \frac{430/AT}{520} = FHP$$

Where:

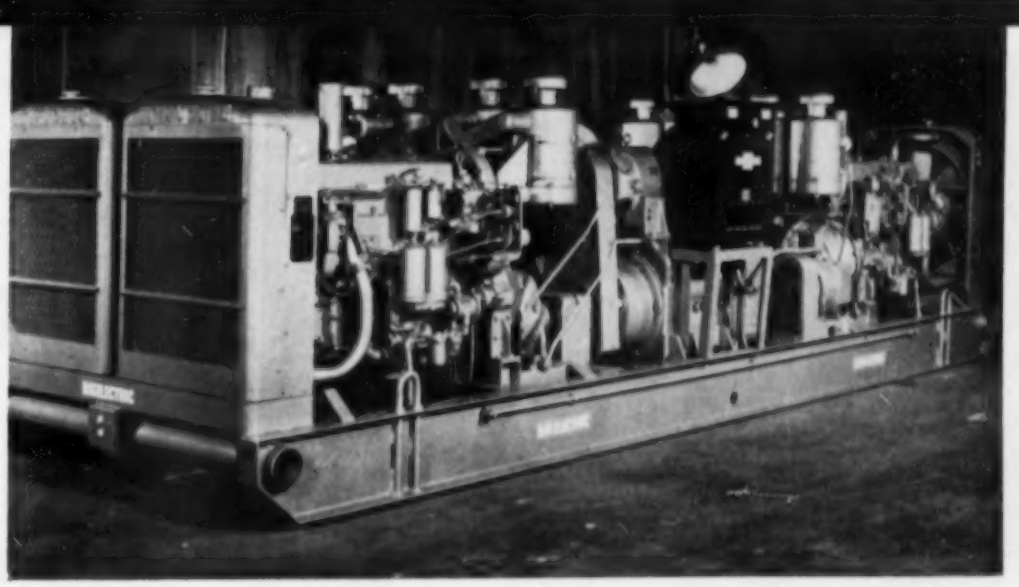
BHPc = Brake horsepower, corrected
BHPo = Brake horsepower, observed
FHP = Friction horsepower
B = Barometric pressure, Hg.
VP = Vapor pressure @ relative humidity, Hg.
AT = Intake air temperature, deg. F.

Drilling Rig Power Drive

Stewart & Stevenson Services, Inc., of Houston, Texas, has recently announced a new line of engineered gas and diesel dc drilling rig power drives. These new lines of engine electric systems are called Rigelectric and Rigelectric arrangements are available with either the General Motors Detroit diesel engine as the prime mover or the Climax natural gas engine. The standard basic power packages consist primarily of two models.

Briefly, the model S12500 unit consists of either two model 6-110 General Motors Detroit Diesel engines rated 250 hp each, arranged in a manner so that one power unit is directly connected to each end of a heavy duty traction type dc generator with a capacity of 600 hp continuous. The engines are connected to the generator shaft extensions through a heavy duty disconnect clutch and flexible connection on each engine. Special attention has been given to the arrangement of the flexible connection to permit satisfactory operation under extreme oil field conditions where considerable misalignment might occur.

The model S241000 Rigelectric dc unit consists basically of either four model 6-110 General Motors Detroit Diesel engines rated 250 hp each, or four model K-75 Climax natural gas engines with the four engines unitized and arranged on a common steel skid type base and powering two heavy duty traction type dc generators with a capacity of 600 continuous hp each.



All four engines and the two generators are compounded in such a manner as to permit the power of from one to four engines to be input to either one or both of the two generators. The engines are connected to generator shaft extensions through heavy duty disconnected clutches, and flexible connections similar to the above described S12500 model unit and essentially the model S241000 unit consists of two of the S12500 arrangements mounted on a common steel sub base with a compound drive tying the units together.

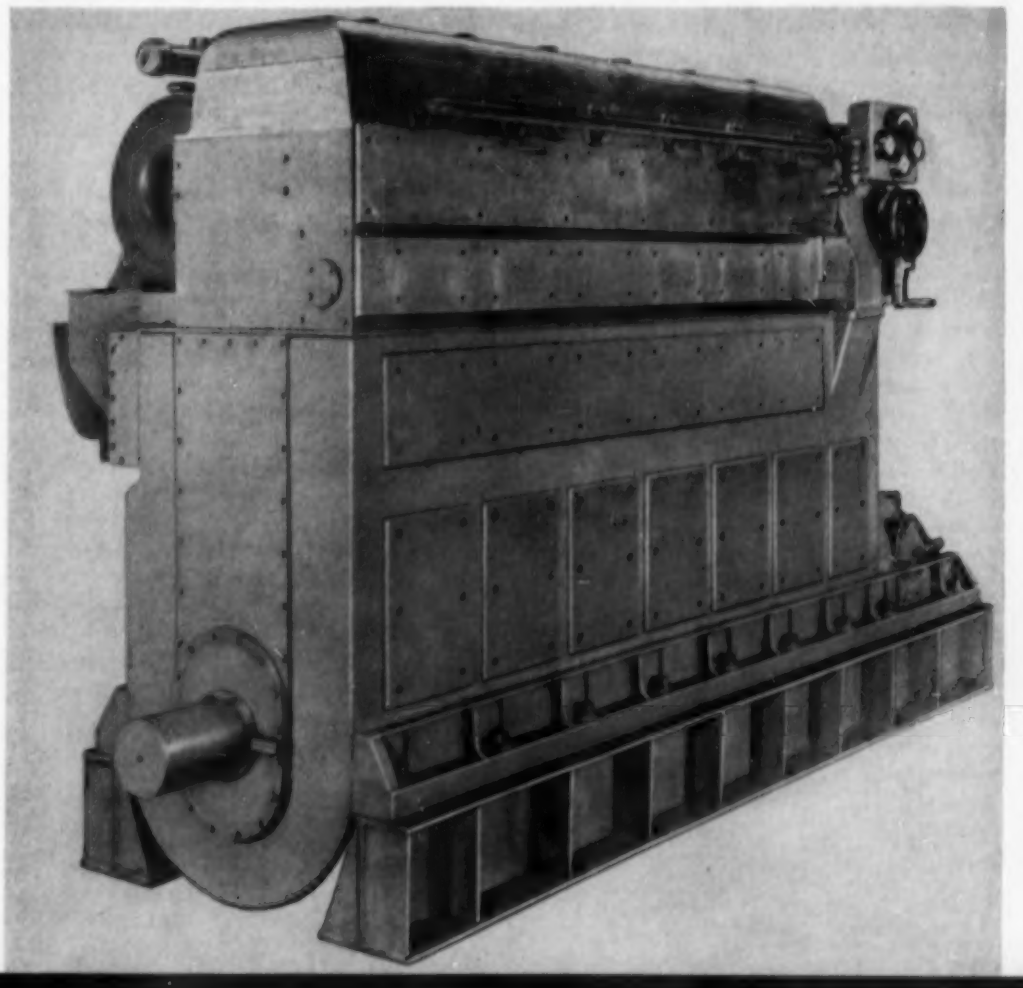
Particular attention has been given to simplification of the entire control system on the Stewart & Stevenson Rigelectric equipment. To insure the very maximum in simplicity and reliability, each motor is operated from an individual generator so that there is never more than one motor being driven from a single generator. This arrangement permits the use of a simple rheostatic, low voltage control to a pilot exciter for each generator which controls the speed of the electric motor without the necessity of a multitude of complicated controls. All generators used on Rigelectric units are interchangeable. All of the heavy duty traction type electric motors are the same size so that in an emergency a replacement or switching of one motor to some other drive can be accomplished easily.

New Diesel for Towboat Service

A new Kahlenberg Model E-6 self-sustained turbocharged two-cycle diesel has been ordered by S & S Towing Company of Joliet, Illinois for use as the main engine in a new towboat. The towboat will be 85 ft. long over-all, with a beam of 26 ft. and a draft of 6 ft. 6 in. It will have a retractible pilot house for upper Illinois River shuttle service operations in the Chicago area and crew accommodations for ten men. The Kahlenberg six cylinder engine has a bore of 10½ in. and stroke of 16 in. and develops 700 hp at 350 rpm and 800 hp at 400 rpm. Pilot house control will be used, and the boat is being built at the Christy Corporation yards at Sturgeon Bay, Wisconsin with delivery scheduled for approximately July 1, 1956.

The new Kahlenberg diesel line was described in the January, 1956 issue of DIESEL PROGRESS, and has aroused much interest throughout the diesel industry. This engine is a vertical two cycle diesel with uniflow scavenging, and is fitted with a Napier turbocharger that operates on the pulse system. This Model E series engine is claimed to be the first self-sustained turbocharged two cycle diesel to be offered in the United States and probably the first in the world with a bore under 12 in.

An outstanding feature of the Kahlenberg diesel in marine service is its ability to start from cold, maneuver and operate under low speed and load conditions without aid from any auxiliary combustion air supply device such as scavenge pump, blower or compressor. These features of quick starting and good operation under low speed and load conditions are also applicable to stationary service as well as marine. The engine's flat fuel curve over a wide range of speeds and low specific fuel consumption provides for good all-around operating economy. It has a piston speed of only 1066 ft. per minute at 400 rpm, which is also indicative of economical operation and long life. This diesel is also very compact and neat in appearance. The six cylinder engine develops upwards of 600 to 900 hp in the 300 to 400 rpm operating speed range and is only 12 ft. 2 in. long and stands just 78 in. above crankshaft center line. The Model E is offered in units of from 4 to 8 cylinders—a range of 400 to 1100 hp per unit.



EASTERN DIESEL OBSERVATIONS

A COMMENTARY BY **ARNOLD B. NEWELL**

Arnold B. Newell, a third generation American, was born near Seattle, Washington of pioneer stock. He obtained his engineer's license at 21. Sailed as chief engineer on one of the first ocean-going motorships built in the U.S.A. In 1924 he joined New York Shipbuilding Company in diesel advisory capacity, tested and took to sea New York-Werkspoor diesels, supervised operation of shipyard owned vessels, then in 1927 joined Ingersoll-Rand as diesel field engineer. Became associated with "Motorship" in 1929. Subsequently became managing editor of "Motorship" and "Diesel Power," then vice-president and general manager.

IT is apparent now that we shall have diesel-electric locomotives capable of picking up third-rail power and proceeding into electrified divisions without changing locomotives. In this there is vast economy for it will eliminate the need of both kinds of locomotives in many divisions. The chief incentive to do this has been in and around New York City where underground operation requires many electric locomotives. It will also reduce the high cost of maintaining the electrified divisions and in many instances it will eliminate delays occasioned by loss of power during bad winter storms.

This in turn raises the important question as to why some diesel-electric consolidated types should not be constantly available for emergency use of subway systems which also extend into the open. In one instance power failure leaves trains stalled in tunnels and unable to bring their panicky passengers out into the open. The diesel fumes which are non-toxic would not be so frightening nor obnoxious to the passengers as the choking smoke from electric fires. The other reason to have some diesels on subway systems is their independence of surface electric power and ability to free the tracks of snow at all times which is not true of the electrics when the third rail becomes glazed with ice. It is our contention that there is no such thing as a "saturation" point in railway dieselization and if the above mentioned matters come to pass, then other equally important betterments will manifest themselves as diesel requirements.

Liberty Ship Conversions. In order to prove the value of various systems of propulsion another government scheme is being tried this time on Liberty Ships. Unlike the original Shipping Board Conversion Program this is not a concentration upon diesel propulsion. A steam turbine plant will be installed in one ship, geared diesel drive in another, a regenerative gas turbine in a third and finally a free piston propelling plant will be installed in the fourth ship. This experimenting with new or different kinds of power is desirable from the viewpoint of an improved and more efficient Merchant Marine although in the more normal course of events power for ocean-going merchant ships will not be much compared to other demands for diesels such as railroading and off-shore drilling.

Twice in the past the government picked up the tab for experimental dieselization of big ships without any substantial benefit to the diesel and the shipbuilding industries. To continue such experiments is desirable. However, two interesting questions need an answer.

First, diesel-electric-gear drive is one of the most universal forms of power in large tugs and towboats and it is not included in the Liberty Ship program. Utilization of the highly developed and wonderfully perfected diesels now driving the locomotives on land could no doubt point to vast economies in space and weight at sea but they would be restricted to the use of rather high grade fuels. In Europe where the motorship is the dominant type of ship, there has been a substantial revival of the use of slow-speed direct connected engines capable of burning residual fuels at a saving of about 50 per cent over the cost of steam turbine operation. Without endeavoring to be too critical of the U.S.M.C. we believe there is reason to ask why haven't the two very popular systems of diesel propulsion been included with the other demonstrations?

Air Cooled Diesels and Arctic Services. Increasing use of diesels in the Arctic raises the question of air cooled instead of water cooled engines. Thus far we have not gone to air cooling so extensively as some of the European manufacturers and yet there are many places where liquid cooling is not too satisfactory. In the sub-zero weather of the Arctic it is possible, of course, to use anti-freeze that will give full protection, but it must be transported expensively and stored and some provision must be made to handle the water with ever present danger of failure to use it properly.

While all this is going on on land or ice as the case may be, the use of small boats in the Arctic introduces the danger of broken castings when sea water cooling is employed. No very low temperature is needed to freeze an engine that is sea cooled. At the same time the need of engine-operated deck machinery points to an air cooled diesel which is inherently free of ignition and carburetion troubles and might just as well be free of cooling problems.

The advantages of air cooling of land based engines are obvious. Thus far there has been an element of bulk and weight, strangely enough, that had to be overcome in order to enter services such as under-car generator drive on the railroads and many portable applications. Possibly the solution lies in American adaptation of some of the European practices. Probably a better solution would be to step up the engineering effort on this in America.

Higher Rotative Speed in Central Power Plants. Generally speaking we look upon the higher speed and consequent reduction in weight of the diesel as improvements which keep down the cost per engine horsepower, and that is all. On several occasions the stability of engine price, on a horsepower basis, over a long long period of time has been pointed out. What many of us have failed to mention is the fact that a driven unit of higher rotative speed—for example an electric generator—costs much less than one of low speed. In central power stations this puts the diesel of higher rotative speed in a better position than its price indicates.

The diesel and electric industries are well aware of this condition, but how many municipalities, utilities and industrial plants operating fine dependable old engines bought many years ago are now aware of the fact that a new diesel will cost no more than the old one did when dollar value was high, and the electrical machinery, gears or whatever the diesel now drives is also cheaper.

Diesel Engine Prices. Some of the discussions that come up within the industry often raise questions which the diesel-buying public may ask. For example at the last Oil and Gas Power conclave we came upon a group in which one man was questioning why diesels cost so much more than gasoline motors, of the same power, speed, etc. He maintained that the only difference is a fuel injection system instead of spark ignition and carburetor. He seemed to be unaware of the fact that considerable thought is given to down-grading diesels, not so much to meet gasoline engine competition as to eliminate waste in the industry. Building diesels to their present high quality is not waste. Evidently the consensus of opinion among diesel makers is that no reduction in manufacturing costs and price warrants a policy of offering a cheaply built engine.

Hard-Working Shovel

This new Lorain #72 shovel recently put to work by the Anderson-Oxandale Rock Company of Herrington, Kansas loads up to 190 tons of rock per hour in the company's quarry near Udall. The company is presently filling an order for 300,000 tons of crushed rock for Peter Kiewit Sons for use on the Kansas Turnpike. The new Lorain is powered by a 6-71 GM Detroit Diesel engine.

Warehouse Opened

Alco Products, Inc., a large manufacturer of diesel engines and locomotives, recently opened a new warehouse in the Vail Field area of Los Angeles County. The building, at 6363 Corsair Avenue, will provide a stockpile of more than 7,000 parts to give Alco customers on the West Coast prompt service on replacement and renewal locomotive and engine parts. The warehouse will serve 15 railroads operating more than 1,000 Alco diesel-electric locomotives, in addition to 14 other customers using transportation equipment.

On hand for the formal opening ceremonies was Alco's newest locomotive, the 1800-hp DL-701 road switcher. Both the locomotive and the new model 251, Vee-type engine that powers it were described in the April, 1956 issue of DIESEL PROGRESS. The locomotive on display in Los Angeles has been on demonstration runs on railroads from coast to coast. This new model has been ordered by nine railroads throughout the country.

Alco's new warehouse has 21,000 square feet of floor space and is 100 feet wide and 250 feet long. It is of tilt-up reinforced concrete construction in keeping with industrial-construction developments on the Coast. The building has 14-foot overhead clearances throughout. It is fronted by field stone and glass, with a broad planting box across the front. Air-conditioned offices for district sales and customer service personnel are at the front of the building. The storage sections of the structure have been designed for palletization and other modern methods for handling supplies. The building has an adjustable dock ramp at one side and is served by a Santa Fe railroad spur at the rear. The company has similar new warehouse facilities in Chicago and St. Louis.

Division Name Change

The Industrial Power Division of the International Harvester Company, Chicago, Ill., is now known as the Construction Equipment Division, according to an announcement by Harald T. Reishus, vice president of that division. The change applies to name of division only and does not affect personnel or line of equipment. Crawler tractors; industrial wheel tractors; two-wheel, high-speed earthmovers; towed scrapers; bulldozers; front-end loaders; engines; and off-highway trucks, will continue to be marketed under the new division name of Construction Equipment Division.

Mr. Reishus, in announcing the change, effective April 20, said: "We have long felt the name Industrial Power Division did not accurately describe the products or the activities of this division. Since the introduction of our new 1956 line of earthmoving equipment, increased inquiries from the field made it highly desirable to select a name befitting the equipment this division was marketing. Inasmuch as most of the equipment is sold to contractors to be used as construction equipment, we decided those two words—construction equipment—offered the most simple and the most descriptive title we could select. We believe the new name Construction Equipment Division, will be readily understood by both customers and others outside the International Harvester Company."

The World's Leading Manufacturers of FUEL INJECTION EQUIPMENT *for Diesel Engines*

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Depots and Service Agents in over 100 Countries.

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A New Concept in *FULL-FLOW* Filters...

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UNRESTRICTED CORE

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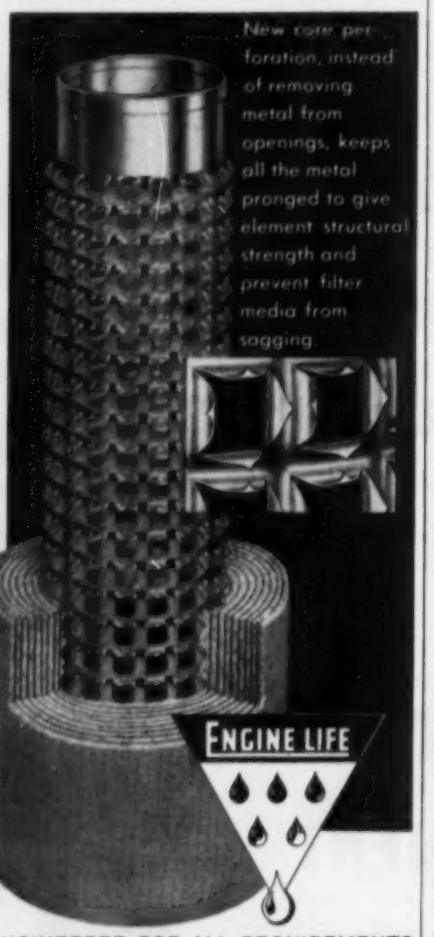
New core perforation, instead of removing metal from openings, keeps all the metal pronged to give element structural strength and prevent filter media from sagging.
ENGINE LIFE

Conditions oil without restricting flow

Here's a brand new ENGINE LIFE exclusive that gives unrestricted oil flow without sacrificing strength. This new core development which required research and development of special machines and tooling right in our own plant, gives you the finest full flow oil filtering yet. Now, even the most viscous lubricating oils and fuels are filtered perfectly. Because core openings can handle up to 10 times the oil pumped through the system, the most excessive surges are easily handled, thereby protecting the hydraulic system from undue restriction and ultimate failure. All integral parts of the new Maxiflo core are of non-corrosive metal.

With Maxiflo, as in all Engine Life Elements, consistency in diameter and length is maintained

ENGINE LIFE elements operate without impairing the hydraulics of your engine. Better oil conditioning is achieved through the ENGINE LIFE absorption method of full filtration. All ENGINE LIFE elements are engineered to meet requirements of your application.

ENGINEERED FOR ALL REQUIREMENTS

Lubrication system flow rates are maintained by the free area ratio of perforation. Openings equal up to 10 times amount of oil volume pumped through engine.

Non-corrosive Metal Cores are end sealed with metal rings to insure trueness, add lip strength.

A COMPLETE LINE OF FILTERS AND REPLACEMENT ELEMENTS

ENGINE LIFE *PRODUCTS CORPORATION*

EL MONTE, CALIFORNIA

Battery Chargers

Brand new in construction as well as appearance is the 1956 line of Willard battery chargers and testers just announced by Willard Storage Battery Division, Cleveland, Ohio. Included is a complete price range of 4 mobile (wheeled model) fast chargers, 4 portable chargers and 4 series chargers. The featured model is the MAT-10-A, a combination charger-tester, automatically adjusting for either 6- or 12-volt batteries. The built-in tester boasts a new automatic load selector with individual cell readings and special prods which penetrate the sealing compound of 12-volt types without gouging. Shut-off control is by Willard's Electro-thermostat; it assures a full charge but protects against overcharge. The new Series Charger line offers 2 half-wave and a full-wave size. A special Model (H-6S-A) includes a double-wound insulated transformer for marine service and for use where electronic equipment is in operation.

Oil Company Names

George J. Gregor, manager of the Lakes division, Socony Mobil Oil Company, Inc., for 13 years, has been named assistant to Guy L. Tate, director and vice president in charge of marketing for Magnolia Petroleum Company, effective May 1, it has been announced by J. L. Latimer, president of Magnolia. Magnolia is Socony Mobil's Southwest affiliate with headquarters at Dallas, Texas. William A. Greeley, who has been manager of Socony Mobil's Rochester, N.Y., district for 10 years, will succeed Mr. Gregor as Lakes division manager with headquarters at Buffalo.

Mr. Gregor joined Socony Mobil in 1922 as a mail clerk at the age of 18. He progressed through positions of bookkeeper, credit clerk, district credit manager, general salesman, and Buffalo district manager before being appointed Lakes division manager. He is a past president of the Buffalo Automobile Club, past vice president of the Greater Buffalo Advertising Club and Athletic Club, a director of the Better Business Bureau, and is a member of the Erie County Traffic Safety Advisory Committee, Chamber of Commerce, the Erie County Petroleum Industries Committee, Park Country Club, and Canoe Club. Mr. Gregor is married and has a daughter, Mrs. Frederick W. Whaley, Jr. of Buffalo.

Mr. Greeley started with the company 24 years ago working in a service station in Buffalo. He subsequently became a service station manager, merchandising instructor, general salesman, district marketing assistant and district manager. He is a member of the Rochester Rotary and Ad Clubs, Chamber of Commerce, and Rochester Club and has served as a trustee of the village of East Rochester.

Fuel Injection Distributor

Fuel Injection and Electric, Inc., a newly formed corporation, began operations in Milwaukee on May 7. The Sales Office and complete facilities to service fuel injection systems and equipment are installed at 934 North Jackson Street. The officers of the company are Benjamin Weber, President, Robert S. Weber, Vice President and Robert J. Baer, Secy.-Treas. The Webers are officers of the P. E. Weber Company, an established automotive distributing organization in Milwaukee. Mr. Robert J. Baer, who will direct sales, is President and Manager of the Alemite Company of Wisconsin, Inc. Lloyd Powers is service manager of the company.

Fuel Injection and Electric has been appointed direct factory distributor for American Bosch. Other products that will be distributed and serviced by this new company are magnetos, voltage regulators, heavy duty generators and electric windshield wipers.

Expands Territory

Stewart & Stevenson Services, one of the nation's largest distributors of diesel engines, has been awarded additional sales and service territory in Texas by the Detroit Diesel Engine Division of General Motors, Joe Manning, Stewart & Stevenson vice-president and general manager, announced.

R. E. Hunter, general sales manager of Detroit Diesel Engine Division of General Motors, notified the Stewart & Stevenson organization that the new territory would include the balance of the Panhandle Area of Texas and Eastern New Mexico. Stewart & Stevenson Services now services all of Texas except the El Paso area as the GM Detroit Diesel Engine distributor in Texas. A new sales and service office is to be opened soon in Amarillo, which will function as a part of the Stewart & Stevenson Lubbock Branch operation, Manning said. In addition to the main plant at Houston, Stewart & Stevenson has other Texas branches and offices at Corpus Christi, Dallas, San Juan, Odessa, San Antonio, Pecos, Tyler, and Longview.

New Pamphlet on Diesel Fuel

Gulf Oil Corporation-Gulf Refining Company has just published a pamphlet describing the properties and advantages of Gulf Dieselect, said to be a specially refined clean-burning fuel for diesel engines. A copy of the pamphlet, No. SP-8610, can be obtained by writing to the company at 1822 Gulf Building, Pittsburgh 30, Pa., or to this magazine.

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"ORBIT-SEEKING," "INSTANT-ACTION" WHEELS

These and other features exclusive in Schwitzer Turbochargers, account for proven installed performance and durability.

"Orbit Seeking" Wheels, as pioneered in Schwitzer Turbochargers, are now being featured in the Turbine Engine Industry.

"Instant Action" wheels assure rapid compressor acceleration for the best installed engine performance.

As your supplier, Schwitzer assures you of the most advanced design and economy in the field of fluid flow and vibration damping products.

SCHWITZER CORPORATION

INDIANAPOLIS, INDIANA

Mid-West Diesel News

By **L. H. Houck**

MISSOURI METHODIST HOSPITAL, St. Joseph, Mo., has had a standby diesel generating plant installed for emergency use. It is a 10 kw Kohler with a Waukesha diesel engine and the job was handled by AAA Engine & Electric, Inc., Kansas City, Kansas.

KANUS TRUCK LINES, Kansas City, Mo., has ordered 30 custom-built International tractors for over-the-road freight service. Cummins 180 hp., turbocharged engines are being used.

MILLER COUNTY, MO., has placed a Caterpillar D4 in county road service. It is equipped with Traxcavator, 80-in. bucket and No. 44 hydraulic control. Fabick & Co., Jefferson City, made the sale.

BRINK'S, INC., has dieselized its Federal Reserve Bank coin and currency hauling service with an International 6-wheel, armored truck with Cummins JT-6B turbocharged diesel. It has a 5-speed main transmission with 3-speed auxiliary, bullet resisting glass, defensive weapon equipment, and will haul money between the Chicago Federal Reserve Bank and member banks in the district.

V. V. GANT STAVE CO., Otterville, Mo., is a new barrel plant which started up this spring with new equipment. Power is a GM 4-71 diesel bought from Western Machine Co., St. Louis.

ALLIS-CHALMERS has sent one of its tractors to college. Newlin Machinery Corp., Kansas City, Kan., sold an HD-6-G high loader to the University of Kansas at Lawrence, where the engineering department will use it to handle material and gravel streets.

EASTERN MOTOR EXPRESS, Terra Haute, Ind., has purchased 120 B-65 Mack light-weight Thermodyne diesel tractors at a cost of more than $1,300,000. The new fleet is used in the 8-state operation of the over-the-road carrier.

U. S. CORPS of Engineers has bought two Allis-Chalmers HD-11-G, 2-yd. crawler loaders from Newlin Machinery Corp., Kansas City, Kan. One was assigned to barge work on the Missouri River at Washington, Mo., and the other was sent to Napoleon, Kansas, for work in the quarry operated by the Engineers.

FARM USE will keep a Caterpillar D4 busy for A. Capfer, Arlington, Mo., who bought it with a 44-inch bulldozer blade and hydraulic control from Fabick & Co., Jefferson City.

CHILES TRACTOR & IMPLEMENT CO., Springfield, Mo., are building a new sales and shop building on U.S. 66 south of Springfield to handle their Allis-Chalmers engine & equipment business.

MIDDLE WEST DEALERS for the new Ford ½-yd. industrial loaders mounted on the new Fordson diesel tractor are: Chico Tractor & Implement Co., Columbus, Ohio; MacCarthy Ford Tractor Sales, Inc., Kankakee, Ill.; and Indiana Tractor Sales, Inc., Indianapolis.

KANSAS CITY PUBLIC SERVICE CO., has bought 70 51-passenger, air-suspension GM busses powered with GM diesels. Costing $23,000 each they will be in service by July 1.

ALLIS-CHALMERS is well represented on the Kansas Turnpike job. Newlin Machinery Corp., report sales of HD-21's with Twin Disc torque converter

Super drive for a super grader

TO GET more "push-power" *at the blade*, Galion uses an Allison TORQMATIC DRIVE in its new T-700 Grade-O-Matic grader.

Galion says the integrated TORQMATIC Converter-Transmission *team* "eliminates the foot clutch – ends 'down-time' for clutch maintenance and repairs – does the shifting *work* for you – makes driving fast and easy."

The Allison TORQMATIC DRIVE multiplies engine torque up to 13½ times, absorbs harmful shock loads and prevents engine lugging and stalling. It gives the T-700 3 forward and 3 reverse speeds–from 0.9 to 20 m.p.h.–and permits the operator to make any shift while moving in either direction.

And the TORQMATIC DRIVE reduces operator-skill requirements in this 20-ton grader because it eliminates the "human element" needed to get top grader performance.

For full information on the Galion T-700 see your Galion dealer or write Galion Iron Works, Galion, Ohio.

and AC's new supercharged diesel, to Tobin Construction Co., Grosshaus & Peterson Construction Co., Clarkson Construction Co., List & Clark Construction Co., Amino Bros., Al Thorne Construction Co., and Reno Construction Co. Each company had one or more in use as a pusher or a dozer.

SANTA FE railroad announces placing an order for 80 new diesel units and the Missouri Pacific announces it has complete dieselization of its entire system with the purchase of 888 diesel units since 1946, 746 of them added during the last few years.

AMERICAN BRIDGE DIVISION of U.S. Steel has installed a 110 hp HRGA-401 Cummins diesel direct connected to a 40 kw generator set for powering a railroad swing bridge. Sale made by Cummins Illinois Engine Sales, Inc., Chicago.

MONTANA HIGHWAY DEPARTMENT has repowered four of its FWD highway maintenance trucks with diesels, using two 180 hp HRFB-600 Cummins and one 175 hp JT-6-B Cummins, all from Cummins Diesel Sales of Montana, Inc., at Billings.

GANT BROS. LUMBER CO., Vienna, Mo., have installed a new GM 4-71 diesel in their sawmill. This firm, established in 1939, now have 1 GM, 1 Caterpillar on heading mill and a Caterpillar on the lumber mill. The new engine was assigned to a new stave mill. Western Machinery Co., St. Louis, handled the sale.

GRANDVIEW AIR FORCE BASE, near Kansas City, has installed a Kato 75 kw generator driven by a P & H diesel engine as a standby unit. AAA Engine & Electric Co., Kansas City, Kan., made the generator set sale.

NEW DETROIT DIESEL dealer for GM in the Chicago area is Gil Boers Equipment Co., 7739 South Kedzie, who will distribute GM industrial and marine diesel engines.

BASEMENT DIGGING contractor, C. E. Case, Cedar City, Mo., has added a Caterpillar D4 with a Teale loader and an 84-inch bucket to his equipment from Fabick & Co., Jefferson City, Mo.

WATER IS BEING PUMPED on the Mount Wheeler Ranch, Salt Lake City, with a 300 hp NRT-6-P Cummins diesel from Cummins Intermountain Diesel Sales Corp., Salt Lake City, Utah.

ASPHALT PAVING CONTRACTOR, Kissick Const. Co., Hickman Mills, Mo., has taken delivery of an Allis-Chalmers HD-11 from Newlin Machinery Corp., Kansas City.

NEW COMPANY, Peninsular Diesel, Inc., will handle Detroit Diesel Div., GM, products in Detroit and Michigan's lower peninsula. It will establish a branch at Grand Rapids. It is headed by Clark F. Andreae, president.

New House Organ

"Lubrication Newsletter," the first issue of a technical house organ issued by The Alpha Molykote Corporation, Stamford, Connecticut, carries as its lead story a discussion of press fitting with molybdenum disulfide lubrication. The article deals with press fitting of plain bearings, ball and roller bearings, gears, sprockets, clutches, flywheels, etc. and includes a thorough delineation of the mathematics of press fits. Curves show press and shrink fit variables as well as elastic changes in diameters of press fits. Also included in "Lubrication Newsletter" is an excerpt of the proceedings of the First International Congress on Molybdenum Disulfide For Lubrication as reported by the German Mineral Oil Association. The Alpha Molykote Corporation will add to its mailing list the names of technical persons who can utilize this lubrication information.

DIESEL ENGINE TROUBLE CHART

POOR COMBUSTION:

Possible Cause

- Wrong fuel
- Wrong injection timing
- Sediment or slugs of water in fuel
- Leaky injection valve
- Carbon on injector
- Overheated injector
- Improper size orifice
- Subnormal compression temperature
- Injector valve sticking
- Weak injector valve spring
- Air in fuel lines
- Incorrect valve timing
- Leaky valve or valves
- Stuck piston rings
- Subnormal water jacket temperatures
- Worn cylinders
- Intake or exhaust ports clogged (2 cycle engines)
- Light loads
- Cold intake air
- Overlubricated cylinder walls

EXHAUST SMOKE:

Possible Cause

- Weak compression
- Sticking or worn nozzle
- Cetane fuel too low
- Excessive amount of oil reaching combustion chamber
- Unequal power output of cylinder
- Dirty air filter or silencer
- Misfiring
- Leaky inlet or exhaust
- Inadequate air supply
- Sticky or worn piston rings
- Inlet air or jacket water too cool
- Worn or scored cylinders

HIGH OIL TEMPERATURE:

Possible Cause

- Overheated bearing surfaces
- Not enough oil in circulation
- High water jacket temperatures
- Crankcase insufficiently cooled
- Plugged oil cooler
- Oil badly contaminated
- Late combustion
- Overloading

ENGINE OVERHEATS:

Possible Cause

- Lack of cooling water
- Incrustations in water jacket
- Obstruction to circulation of the water
- Damage to water pump
- Fuel injection too late
- Inadequate lubrication

CYLINDER WEAR:

Possible Cause

- Corrosion caused by water from products of combustion or by leaky head gasket
- Abrasive material from dust in air
- Sulphur loaded fuel
- Insufficient or incorrect oil
- Overheating
- Blow-by
- Frequent cold starts
- Piston ring pressure too high
- Misaligned connecting rod
- Cylinder distortion

HIGH OIL CONSUMPTION:

Possible Cause

- Loose bearing fits (in pressure system)
- Excess oil reaching cylinders
- Bearing end play excessive
- Plugged oil wiper rings
- Oil pressure too high
- Oil diluted with fuel
- Oil leaks
- Piston rings not fitting properly
- High oil temperature

CITIES SERVICE C-300 DIESEL OIL: ANSWER TO MANY PROBLEMS!

As is evident by the chart, many problems experienced with diesel engines can result from insufficient lubrication or the use of an unsuitable oil.

To avoid these problems before they begin, an increasing number of diesel operations have switched to Cities Service C-300 Diesel Oil. The reason: Cities Service C-300 is made from the finest base oils to conform to Military Specification MIL-0-2104A . . . is high detergent and high dispersant . . . strongly fortified against oxidation and corrosion.

But results are what count and here are the outstanding results reported by users of Cities Service Diesel Oil. Says a leading power plant: "We get 23,205 brake horsepower hours per gallon of lube oil." Says another: "Engine compressions are the same after four years as after three months; liners worn only .0015"." And still another reports over 30,000 hours of use on its Nordbergs—six years without any appreciable wear using Cities Service Diesel Oil!

In short, users are unanimous in praising Cities Service Diesel Oil as the finest they've ever used. Try it and you'll agree. Talk with your nearby Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

COMBUSTION CHAMBER DEPOSITS:

Possible Cause

- Dust from air
- Imperfect combustion
- Unsuitable oil

ENGINE ROUGHNESS:

Possible Cause

- Imperfect injection
- Cetane number of fuel too low
- Injection timed too early

SUDDEN STOPPAGE:

Possible Cause

- No fuel
- Water or air in fuel line
- Too heavy fuel
- Dirt or gum in fuel
- Plugged fuel line
- Lubrication failure
- Overheated engine
- Seized or tightened moving part of engine

Northeast Diesel Notes

By A. B. Newell

BY MID-SUMMER the New York, New Haven and Hartford plans to have three prototype trains of the lighter weight class in main line service between New York and Boston. Three different makes will be tried out. They will be identified later in these columns.

A NEW CATERPILLAR diesel D375 of V-8 design, rated 350 hp at 1300 rpm. was just installed in the dredge *Little Savage* owned by Hugo Spatenga of Freeport, Long Island. It will drive the main dredge pump.

THE SAVIN CONTRACTING Company, owner of several Waukesha diesel driven Lorain shovels have just added a Model L820 to their equipment. This is powered by a Waukesha WAKD. Friedman Equipment Company of Bridgeport, Conn. is the supplier to this well known operator on thruway work.

WITH THE installation of another Caterpillar D1700 the Manhasset Lakeville Water District on Long Island, N. Y. has three of the same make and power. Ramsco Associates of 75 West Street, New York purchased and installed the engine. H. O. Penn made the sale.

IN ORDER to give better service, improve operation efficiency and reduce costs of operation, we have been reliably informed, the New Haven Railroad will shorten the electrified system to Stamford, Conn. Under the present system locomotives are changed at New Haven.

FAIRFIELD COUNTY Construction Company of Bridgeport, Conn. has added a new L50 Lorain shovel to its equipment. It is powered by a Cat D318.

A COMBINATION of Thornycroft construction and 1600 hp Deltic engine in three 70 ft. personnel boats for use on the Gulf of Mexico will spring a surprise in high speed transportation by water with a speed of 35 mph. Owners prefer to remain anonymous.

THE NEW more powerful Fairbanks-Morse O-P diesel-gear driven tugs for the N.Y.N.H. and H.R.R. will soon be working the treacherous waters of Hell Gate where even today with high-powered motor tugs as "thick as fleas" around Metropolitan New York, we occasionally hear of a barge struck and stuck on the rocks. The New Haven hopes more power will also help the dispatchers.

IT IS NOW anticipated that the two new Alco diesel powered ferry boats for the Governor's Island run will be in service by midsummer. After completion by the John H. Mathis Company of Camden, New Jersey, these fine 180 footers, each with a passenger capacity of 1100, had to await completion of new ferry docks before being commissioned officially. However, they have been delivered to the Fort Jay Army Post on the island.

WHAT HAS BEEN a foregone conclusion in railroading, especially within New York City limits is now destined to become a reality. It is the use of diesel-electric locomotives that can also pick up third-rail power and continue into the stations without changing locomotives. This change is said to be slated for implementation by the New York Central and the New Haven in the not-too-distant future. Quite probably other lines will follow suit.

THE ATLANTIC Gulf & Pacific Company now has three Caterpillar diesels in their fleet. One is a D375 in the *Esther*. They have a D397 in the *Minnie S* and early this year they installed another D397 in *The May*.

This new 1400 H.P. Superior Diesel was installed in 1955 in the 118 foot tug "Johnstone Straits" owned by Straits Towing Ltd., of Vancouver, B. C. Due to the rugged open chamber Superior combustion system and the special know-how of White Diesel engineers, *the tug now operates almost exclusively on low cost bunker fuel!* This has resulted in a 53% fuel cost savings!

The tug is in service on the rugged British Columbia Coast, towing record-size log booms and large sea-going barges. The new 1400 H.P. direct-reversing Superior Diesel swings an 88" diameter, 36"/43" pitch wheel at 350 turns.

Due to the engine's superior performance, when operating on heavy fuel, Straits Towing has made it a matter of practice to use heavy fuel during normal maneuvering. When the engine is to be secured for short periods, up to half an hour, they also stop and start it on heavy fuel.

If fuel savings of this sort, plus the famous dependability, low maintenance cost and minimum down time of Superior and Atlas Diesels interest you, please get complete details from the nearest Sales and Service office listed below. There is a Superior or Atlas Diesel for every marine use from 100 to 2105 B.H.P.

Superior ENGINES · ATLAS Imperial DIESEL ENGINES · White DIESEL

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY • *Plant and General Offices: Springfield, Ohio*

SALES AND SERVICE POINTS: Gloucester, Mass. • Houston, Ft. Worth, Texas • San Diego, Oakland, Terminal Island, California • Ketchikan, Alaska • Washington, D.C. • Portland, Astoria, Oregon • Casper, Wyoming • Halifax, Nova Scotia • Vancouver, B.C. • Park Rapids, Minnesota • New York • Chicago • Seattle • New Orleans • St. Louis • Wichita, Kansas

THE COMPANIA Popular de Transporte of San Juan Puerto Rico will have Cummins diesels installed in a pair of steel hulled ferry boats being built by the Miami Shipbuilding Co.

THE ARCHER'S Industrial Welding Co. of Covington, Va. will install a General Motors Model 4-71 diesel in a 28 ft. round bottom utility boat they are building for an undisclosed owner.

THE DONALDSON Towing & Lighterage Company of Wilmington, Del. has ordered a 92½ ft. diesel tug from the Equitable Equipment Co. of Madisonville, La.

NORDBERG 1600 hp diesels are to be installed in the 110 ft. tug ordered by the Material Service Corp. of Chicago from the Calumet Shipyard, also of the Windy City.

CONSIDERABLE apprehension is apparent in the New England fishing towns over the "threat" of invasion of the Grand Banks and other offshore fishing areas by the huge diesel driven factory ships and trawlers being built in European shipyards. In this instance there is no fear of competition on the domestic market. Further depletion of the fishing grounds and resultant smaller catches by vessels operating out of New England is what they fear.

THE KAHLENBERG diesel is suggested as a propulsion engine for trawlers designed by John A. McAleer in an article in the April Maine Coast Fisherman. Not only the propulsion system but the entire design is interesting. Also, we read of diesel boats catching fish to feed mink. First time we knew ladies who wear mink indirectly pay for diesel driven boats.

THE CITY of Willimantic, Conn. has installed a Caterpillar D364 diesel delivering 275 hp at 1300 rpm in the town's water works. The engine was sold by H. O. Penn Machinery Co. of New York City.

THE GREAT Lakes Towing Company is repowering another six steam tugs with General Motors, Cleveland, Model 498 turbocharged diesels.

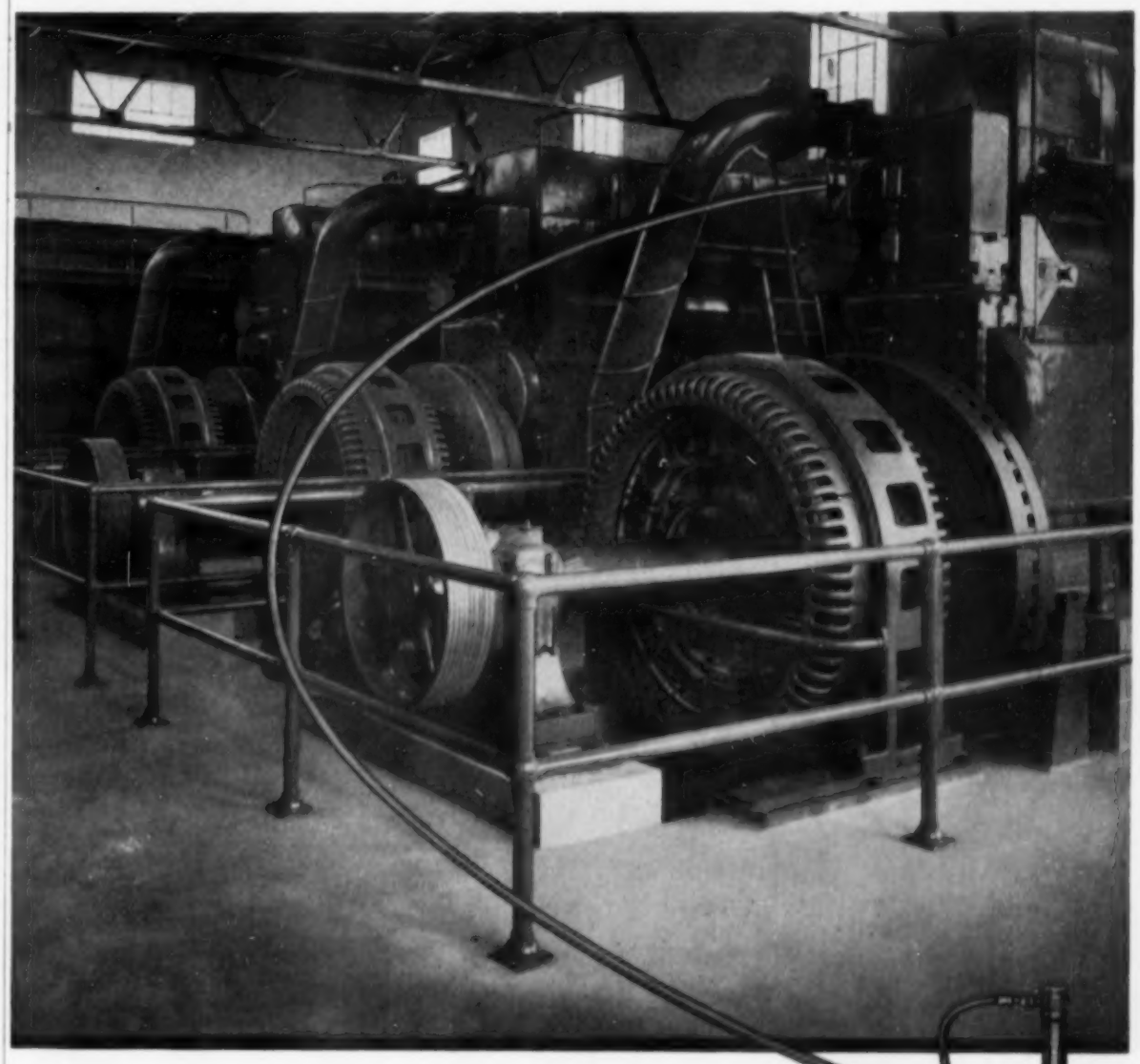
THE JAKOBSON Shipyard at Oyster Bay, N. Y. has completed another Farrell Lines feeder ship for service in West Africa. This all welded steel vessel is 145 ft. x 31 ft. x 10 ft. 9 in. with a dwc of 219 tons. It will carry a crew of eleven officers and men. A pair of Model 6-110 General Motors, Detroit diesels rated 480 hp drive the twin screws. The boat will proceed under its own power to its base of operations.

OPERATION of diesel driven railcars on branch lines of the New Haven Railroad is credited with better service and increasing popularity of that carrier.

A 55 ft. trawler, the *Golden Dawn*, has been delivered to Philip Bodoni of Gloucester, Mass. by the Morehead City, N. C. Shipbuilding Corporation. The propulsion engine is a General Motors, Detroit diesel, Model 6-110 with 3.75:1 reduction gear driving a 42 in. x 38 in. Columbian wheel.

And speaking of fuel, its the heavy stuff burned under boilers that makes steam power the diesel's prime competition. Looks as if we will have to burn the residuals whether or not we like to.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 21 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.



NO STUCK RINGS!

Stop the formation of varnish, sludge and carbon in your Diesels and *keep it stopped* with Sinclair RUBILENE®, the high viscosity index oils proved by over 35 years in industrial Diesel applications. RUBILENE earns its reputation by its performance under continuous operation and heavier loads. It fights deposits and gives better protection to cylinders, pistons, rings and other vital moving parts. Your Diesel stays on the job longer . . . service time is cut 'way 'way down!

Let RUBILENE help solve your lubrication problems. Regardless of the make or age of your Diesel, where a high VI oil is needed, there's a member of Sinclair's RUBILENE or RUBILENE HD family that meets your requirements exactly. Call your local Sinclair Representative for further information or write for free literature to Sinclair Refining Company, Technical Service Division, 600 Fifth Ave., New York 20, N. Y. *There's no obligation.*

SINCLAIR RUBILENE OILS

Marine Meeting

The Honorable Lionel Chevrier, President, The St. Lawrence Seaway Authority, Ottawa, Ont., Canada, was the principal speaker at the Annual Spring Meeting Dinner of The Society of Naval Architects and Marine Engineers. The affair was held in the Ball Room of The Sheraton-Mt. Royal Hotel, Montreal, P.Q., Canada, on the evening of May 4, 1956. This was the concluding feature of the annual two-day spring meeting session of the Society which each year is held in a different part of the country. With eleven active sections of the Society, the meetings have been held in recent years in widely separated regions, such as Philadelphia, Seattle, Boston, New Orleans, and San Francisco.

The Eastern Canadian Section, which was organized in 1952, was host for the 1956 Spring Meeting, the first national meeting of the Society to be held in Canada. The program was arranged by a steering committee of 18 under the Chairmanship of A. R. Riddell, Principal Surveyor for Canada, Lloyd's Register of Shipping, Montreal. The retiring Chairman of the Eastern Canadian Section is Robert Black, General Manager, Davie Shipbuilding and Repairing Co., Ltd., Lauzon, P.Q., and the incoming Chairman is Thomas W. D. Abell, Vice-President, Canadian Vickers, Ltd., Montreal.

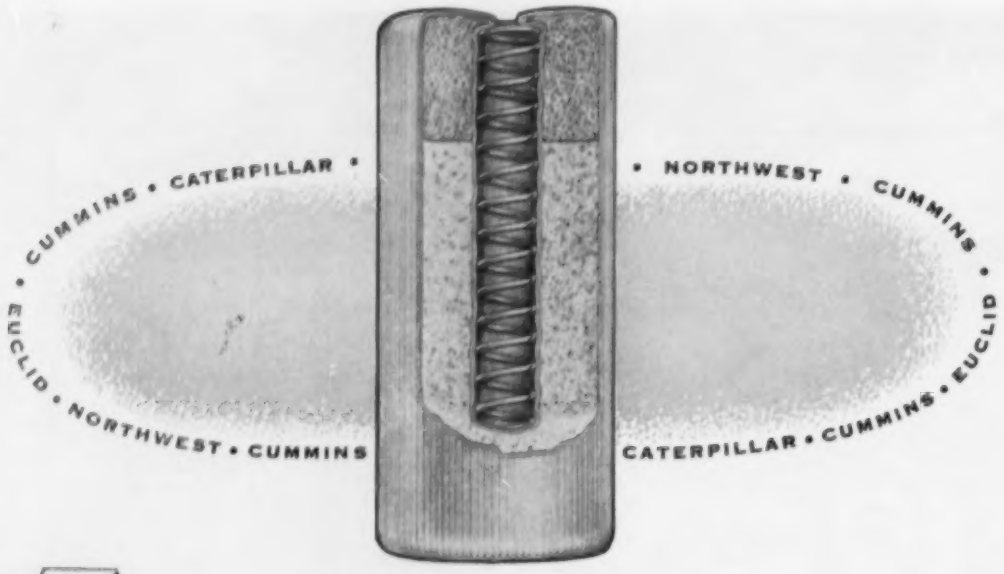
Vice Admiral Earle W. Mills, USN (Ret.), President of the Society and President of the Foster Wheeler Corporation, New York, presided at the two technical sessions held at the Sheraton-Mt. Royal Hotel in the morning on May 3 and 4. Four technical papers were presented at the sessions, these having been prepared by Canadian and United States Members of the Society. The subjects covered by these papers were: The Economics of Future European-Great Lakes Freighter Service; The St. Lawrence River Canals Vessel; Habitability in the Ships of the Royal Canadian Navy; Series 60—The Effect upon Resistance and Power of Variation in LCB Position. The meetings and dinner were attended by members of the Society engaged in the shipbuilding and ship operating industries, and allied trades, located in all sections of the United States and Canada.

Buffalo Company Named Agents

Bass Industrial Equipment Company, 6045 Main Street, Buffalo, N.Y., has been appointed Western and Central New York sales representative for Burgess-Manning Company, Industrial Silencer Division, S. G. Paddock, Burgess-Manning vice president, has announced. The Buffalo concern, which is headed by Roy A., and Kenneth Bass, are agents for Burgess-Manning Exhaust and Intake Snubbers, Gas Regulator Silencers, Pulsation Snubbers, and combination Air Intake Cleaner-Silencer systems.

Bulletin on Transformers

New electrical and mechanical features of Allis-Chalmers redesigned distribution transformers for rural service are described in a new bulletin released by the company. The units are available with "Thermalite" overload indicator or with a self-protecting arrangement against lightning surges, switching surges, short-circuits, or harmful overloads. Also described in the bulletin are transformers with arrester-load limiter combination as well as an arrangement with double gap internal protective link. Mechanical data on the conventional type as well as the self-protecting type are also included in the bulletin. Copies of "Distribution Transformers for Rural Service," 61B6726B, are available on request from Allis-Chalmers Manufacturing Company, 961 S. 70th Street, Milwaukee, Wisconsin.



MANNIX LTD.

PROTECTS ITS ENGINES WITH WINSLOW FILTERS

Mannix Ltd., operators of one of the largest machinery pools in North America, last year standardized on Winslow CP* elements for practically all powered equipment. Engine filters are stenciled to identify the correct filter element, and maintenance men and operators are provided with cross reference manuals that also specify the elements to be used.

According to Mannix service records, Winslow Filters have improved both the useful life of oil and the life of equipment, and the standardization program has shown advantages in efficiency and economy. The principal gain has been in longer periods between engine overhauls, and reduced repair costs and operating expense for many types of powered equipment.

WINSLOW FILTERS

CP (controlled pressure) is protected by patents and trademarks.*

Winslow Engineering Company • 4069 Hollis Street • Oakland 8, California

West Coast News

By James Joseph

TO MILLER LOGGING CO., Eugene, Ore., a Link Belt TC-90 shovel-type log-loader powered by a 6DA-844 Allis-Chalmers diesel, with Twin Disc Torque Converter.

FOR MONTPEILIER, Idaho's, Grunig Implement Co., a 2 cylinder Model 49 Fairbanks-Morse 54 hp diesel.

FOR HILO, Hawaii's, Hawaiian Broadcasting System, two Fairbanks-Morse 5¼ hp, model 45 diesel generating sets.

RALPH MORTENSEN, Gig Harbor, Wash., has repowered his 42-ft. salmon troller *Totem* with a GM 3-71.

A GM 6-110, 300 max. hp and 220 continuous, has been installed in a new steel tug abuilding for Ketchikan Pulp Co., Ketchikan, Alaska.

A GM 4-51, 43200 marine propulsion unit has gone into Hubert Koskey's 38-ft. salmon troller, *Seacrest*, working out of Seattle.

TO Decker Brothers, Roseburg, Ore., a Link Belt LS-108, powered by an Allis-Chalmers 6DA-779 diesel set up with Twin Disc torque converter with disconnecting clutch and air tongs for log loading.

GUY F. ATKINSON, constructors, has taken delivery of two new 54-B Bucyrus-Erie's, with 8DAS-1125 Allis-Chalmers diesels, each with a Torcon torque converter.

FOR Dr. B. N. Collier's 40 ft. sailboat, a GM 4-51 auxiliary engine. Boat operates for pleasure in and around Seattle.

FOR the 38 ft. salmon troller *Sea Bird*, owned by Alfred and Barney Chevalier, a GM 4-51, 43200 marine propulsion unit.

A TURBOCHARGED Allis-Chalmers 6DAT-844 has gone into a new B-81 Mack truck purchased by Booth Kelly, Springfield, Ore. Mack has Quadruplex transmission, 20 speed main box.

TO "K" LINES, Coos Bay, Ore., two new 8DATMR-1125 Allis-Chalmers marine engines for a 52-ft. tug boat, the installation with Twin Disc MG-511 marine gears and 3:1 reduction ratio.

PORTLAND'S Hamilton Engine Sales, Inc. reports delivery of ten new White freight liners powered with 6DAT-844 Allis-Chalmers diesels to Consolidated Freightways, Portland.

FOR WEST LOS ANGELES' Leich Sales Corp., a Fairbanks-Morse 180 hp., 6 cylinder Model 49 diesel engine. Sale reported by F-M's diesel division manager, C. E. Dietle.

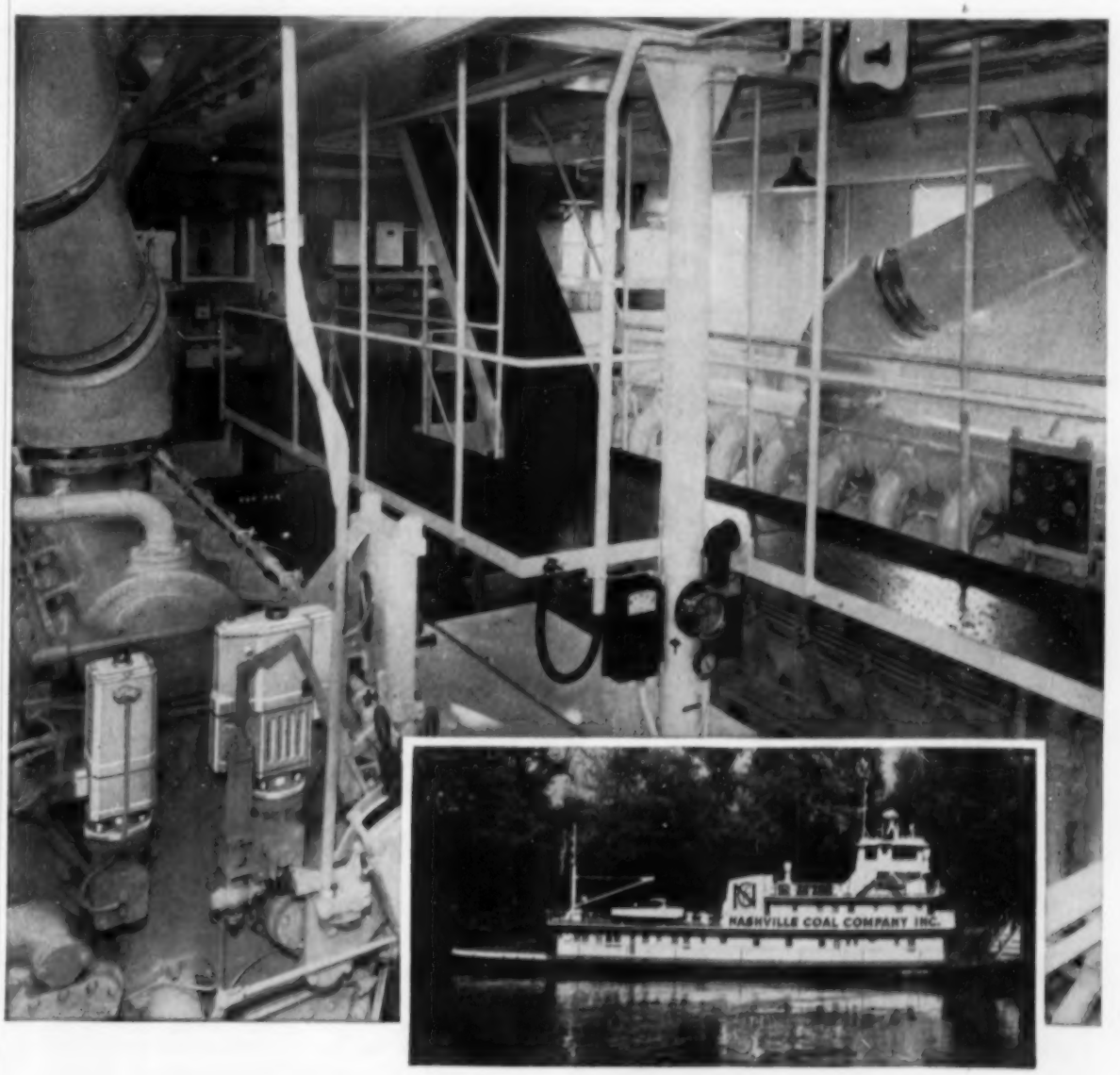
SIXTEEN FAIRBANKS-MORSE model 49B4½ 6 cylinder engines have gone to Mexico's Abastecedores de Maquinaria, Torreon, in state of Coahiula.

TO GRASS VALLEY, California's Motor Electric Service Co., a Fairbanks-Morse model 45B, 5¼ hp. diesel.

INSTALLED in Thomas Eckrol's 40-ft. salmon troller *Tonto II*, a GM 4-51, 43200 marine propulsion unit. Sale by Seattle's Evans Engine and Equipment Co., Inc.

TO MCCALLIE LOGGING Co., Sweethome, Ore., a new Allis-Chalmers model 6DAS-844 and a P & H log loader with Western Gear torque converter.

FOR THE PURSE seiner *Tern* (57 ft. length), a GM 6-110, 300 hp. maximum, 220 continuous diesel marine engine. Vessel's owned by Gilbert Hamilton, operates in Seattle waters.



New River Towboat equipped with

Marquette HYDRAULIC GOVERNORS

Owner and Operator: Nashville Coal Co., Inc., Uniontown, Ky.
Designer and Builder: Nashville Bridge Co., Nashville, Tenn.
Engines: Built by Cleveland Diesel Engine Div. of General Motors Corp., Cleveland, Ohio.

Massey GOVERNORS

Marquette GOVERNORS

Engineering facilities and service agencies for Massey and Marquette Governors are at your disposal for all problems of governing and control.

MARQUETTE METAL PRODUCTS DIVISION
CURTISS-WRIGHT
CORPORATION • CLEVELAND 10, OHIO

Other Marquette Products: ROLLER BEARING TEXTILE SPINDLES WINDSHIELD WIPERS FOR AIRCRAFT • SPRING CLUTCHES ROTARY OIL PUMPS • PRECISION PARTS AND ASSEMBLIES

Management Reorganization

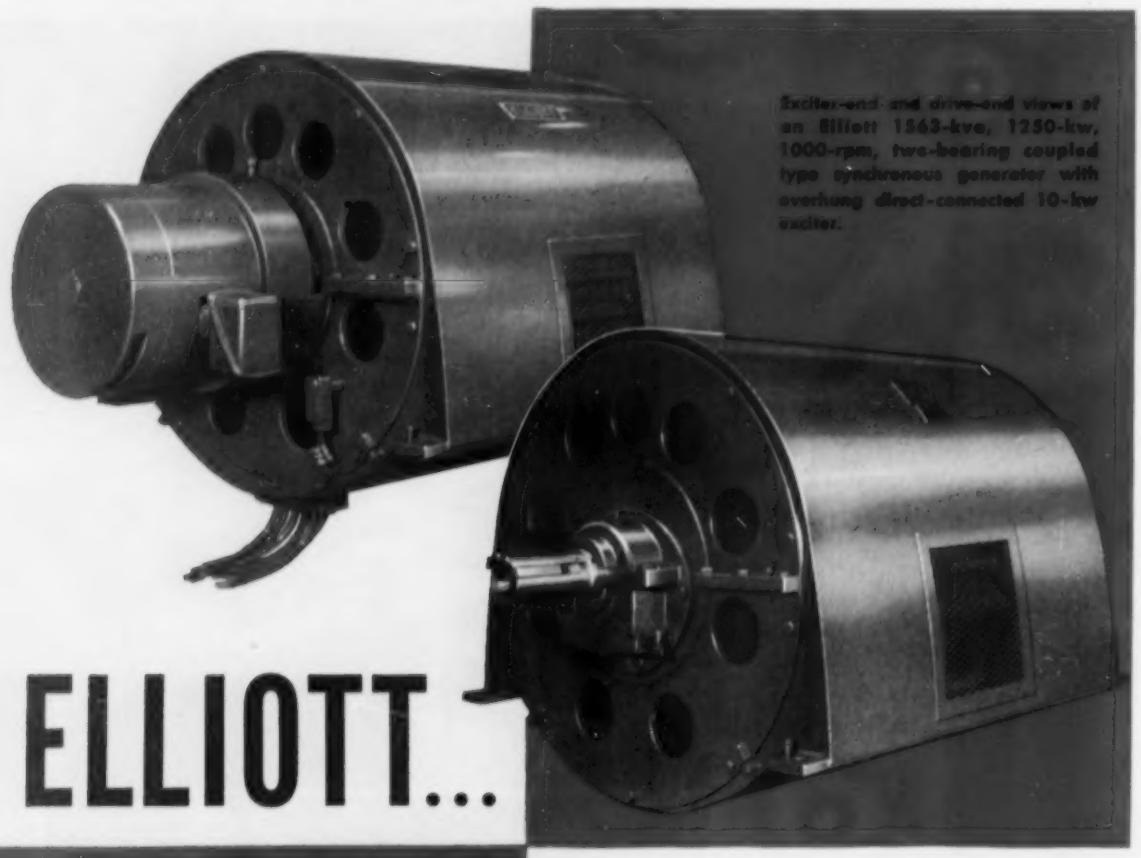
Robert S. Ingersoll was elected President of Borg-Warner recently in a major reorganization of the corporation's top management. He previously was an Administrative Vice President. Roy C. Ingersoll, formerly Chairman of the Board and President of Borg-Warner, was re-elected as board chairman and was named chief executive officer but relinquished the Presidency which he has held for six years.

Lester G. Porter, previously an Administrative Vice President, was elected to the newly re-created position of Executive Vice President. Albert Steg, formerly Treasurer and Controller, was named Financial Vice President and Treasurer. Robert W. Murphy, Vice President and General Counsel, was given the additional responsibility of Vice Chairman of the Executive Committee. Messrs. Robert S. Ingersoll, Porter, Murphy and Steg were elected last year to the Board of Directors. Roy C. Ingersoll has been a director since 1930.

The selection of Robert S. Ingersoll, 42, as President and chief operating officer climaxes his steady rise through the executive ranks of the corporation. He first joined Borg-Warner in 1939 and worked in various research and engineering capacities until 1942, when he was appointed Works Manager of the Kalamazoo, Mich., plant of the Ingersoll Steel & Disc Division. He served in that position until 1946, when he became Works Manager of the Chicago plant of the Ingersoll Steel Division. He was Vice President of that division from 1948 to 1950, then President of the Ingersoll Products Division from 1950 until 1954.

He served as President of Reflectal Corp., a subsidiary, from 1952 to 1954. He was named an Administrative Vice President of the parent Borg-Warner corporation in 1953. He is also Chairman of the Board of Borg-Warner Limited, a British subsidiary; President of the Petro-Mechanics Research Division, and a director of several subsidiary companies. Robert S. Ingersoll's family roots extend far back into the history of the Borg-Warner organization. His grandfather, Stephen A. Ingersoll, was the founder (in 1884) of the Sandoval Manufacturing Co., later the Galesburg Coulter-Disc Co., which was merged early in 1929 with the then only ten-month-old Borg-Warner Corp. The Galesburg Coulter-Disc Co. became the Ingersoll Steel and Disc Division of Borg-Warner with Bob Ingersoll's father, Roy C. Ingersoll, as the first president of the division. In the summers during his years in Phillips Academy and in the Sheffield Scientific School of Yale University, Bob Ingersoll worked at many different jobs in the plant and offices of the Ingersoll division. After graduation from Yale in 1937, he was employed for two years immediately afterward in the plant, training department, export division and sales department of American Rolling Mill Co. (now Armco Corp.,. In 1945 the national Junior Chamber of Commerce voted him to be one of the ten outstanding young men in the country.

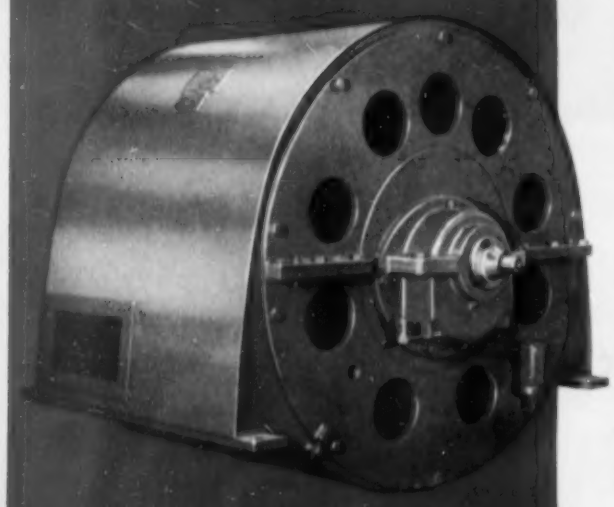
Roy C. Ingersoll, 71, now Chairman of the Board and chief executive officer of Borg-Warner, has long been prominent in the national and state business scene. He is a director and former Vice President of the United States Chamber of Commerce, a director and member of the executive committee of the Rock Island Railroad, a director of Kelsey-Hayes Wheel Co. and past President of the Illinois Chamber of Commerce. Prior to his elevation to the over-all Presidency of Borg-Warner early in 1950, Mr. Ingersoll was a Vice President of the corporation and President of its Ingersoll, Franklin and Calumet Steel Divisions. He became Chairman of the Board and President in 1955.



Exciter-end and drive-end views of an Elliott 1563-kva, 1250-kw, 1000-rpm, two-bearing coupled type synchronous generator with overhung direct-connected 10-kw exciter.

ELLIOTT...

ANNOUNCES A NEW LINE OF HIGH-SPEED A-C GENERATORS



An Elliott 1413-kva, 1130-kw, 900-rpm, single-bearing, coupled type synchronous generator with stub shaft extension for a belt-driven exciter.

FEATURING NEW FLAT BEARING BRACKETS of rigid plate construction. These brackets assure vibration-free operation and yet are lightweight for ease of handling during maintenance operations. The split construction of the bracket permits quick removal of the upper half for periodic inspections. The large holes provide easy access to generator collector-ring brushes and permit unrestricted flow of ventilating air into the machine.

There are a variety of frame enclosures available with either one or two bearings of the ring- or pressure-lubricated type. The frame design minimizes the possibility of recirculation of ventilating air through the machine.

For complete information, consult your local Elliott field engineer or write Elliott Company, Ridgway, Pennsylvania.

ELLIOTT Company

STEAM TURBINES • MOTORS • GENERATORS • DEAERATING HEATERS
EJECTORS • CONDENSERS • CENTRIFUGAL COMPRESSORS • TURBOCHARGERS • TUBE CLEANERS • STRAINERS

Expansion Program

AN $8 to $10 million refinery improvement and expansion program has been approved in Tulsa, Okla., by the directors of Sunray Mid-Continent Oil Co. at their regular quarterly meeting. D-X Sunray Oil Co. is the company's refining and marketing subsidiary.

First quarter earnings for Sunray Mid-Continent Oil Co. and subsidiaries, including D-X Sunray Oil Co., were 63½ cents per share, as compared with pro forma earnings of 51 cents per share for the comparable quarter of 1955. Sunray Mid-Continent's gross operating and other income for the first three months was $81,600,000. Net income amounted to $11,300,000 as compared to $8,500,000 on a pro forma basis for the same period prior to the May 1955 merger of Sunray and Mid-Continent.

Vice-President Named

Election of Allen C. Menke, 34, as vice president, air conditioning and heating sales, was announced recently The Trane Company, 43-year-old firm of manufacturing engineers in air conditioning, heating, ventilating and heat transfer. Menke is a 1943 engineering graduate of Purdue University, where he was an honor student and captain of the basketball team. He joined the company in 1948 and has served as sales manager, air-conditioning, since 1954.

In other promotions, R. H. Pearse, Jr., becomes sales manager, air conditioning; William C. Dackis, manager, heat-exchanger sales; A. James Hackl, sales manager, packaged equipment; Harry F. Griese, Jr., manager, Climate Changer sales; and C. L. Ringquist, manager, applications engineering department.

New Company Offices

The Perolin Company, Inc., manufacturing chemists since 1904, has announced that effective May 1st its executive offices and headquarters for its Eastern Industrial, Marine and Export Divisions are located in the Empire State Building, New York, N.Y. The Western Industrial Division of the firm, which manufactures fuel oil additives and water treatment chemicals, will be maintained at its present location, 1112 West 37th Street, Chicago 9, Illinois. The New York office was formerly located at 10 East 40th Street. Among the products manufactured by The Perolin Company are compounds for treatment of steam boilers, steam lines, fuel oil, cooling systems, and water supply systems for industrial and marine installations as well as a complete line of industrial and marine cleaners. They are known by the trade names of Perolin, Formet, Pero-Nite, and PeroKlean. These products are distributed throughout the United States, Canada, Europe, Great Britain, Africa, and the Near and Far East.

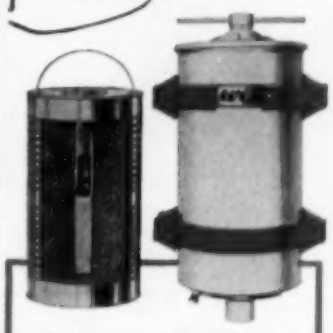
New Folder

A new four-page folder which includes a check list to show construction men how to choose the correct portable power plant for every job has been prepared by the Master Vibrator Company of Dayton, Ohio. A chart which gives the amount of wattage needed to run various types of power tools is featured. The illustrated folder also gives specifications of the new Master generators, as well as photos of these portable generators at work on representative jobs. To get a copy of this handy folder, write to Master Vibrator Company, 265 Stanley Avenue, Dayton, O.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 21 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.

THERE'S ONE RIGHT ANSWER IN ENGINEERING • • •

...AND IN DIESEL OIL FILTRATION



Large-Capacity Filters, including the WF-750 with bar-type cover handle for heavy duty applications — eliminates troublesome cover bolts, speeds cartridge changing.

Can and Sock-type Cartridges for fuel and lube oil filtration — Filtrant is density-packed in rust-proof metal can or one-piece, lint-free cotton sock.

Prescription-type, HEVI-DUTY Filtrants: Flock-type SPECIAL BLEND for Diesel fuel and lube oil, Resilient Density WIXITE for by-pass systems, choice of Premium WIX-KNIT or Pleated POROSITE for full-flow systems.

Whatever your Diesel filtration problem, WIX Engineering, Research and Development provide the right answer with slide-rule precision. The complete WIX Line includes Oil Filters and HEVI-DUTY Cartridges for every filter-equipped Diesel engine...on construction equipment, trucks and buses, marine, railroad and stationary engines —for fuel or lubricating oil.

Tested WIX Filtrants keep oil cleaner for longer periods. WIX Engineered Cartridge construction assures precise fit and ease of installation. Extensive laboratory facilities, constant field testing and accumulated know-how of many years' experience are your guarantee of the utmost in efficient, economical filtration.

Let WIX Engineering solve your Diesel filtration problems! Write today for the complete WIX Catalog of Filter Cartridges for Fuel or Lubricating Oils . . . or for the assistance of WIX Filtration Engineers.

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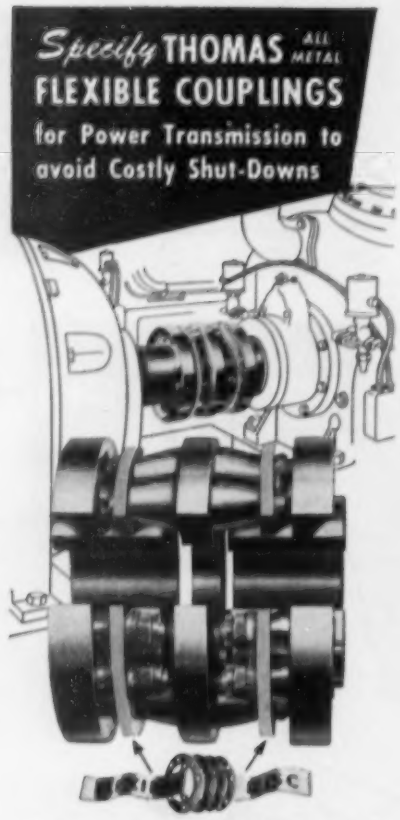
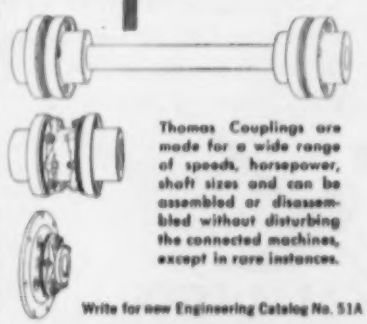


Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

Typical Main Drive Application
in Heavy Duty Marine Service

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention, Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts, Freedom from Shut-downs.
NO BACKLASH	No Loose Parts, All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

New English Marine Diesel

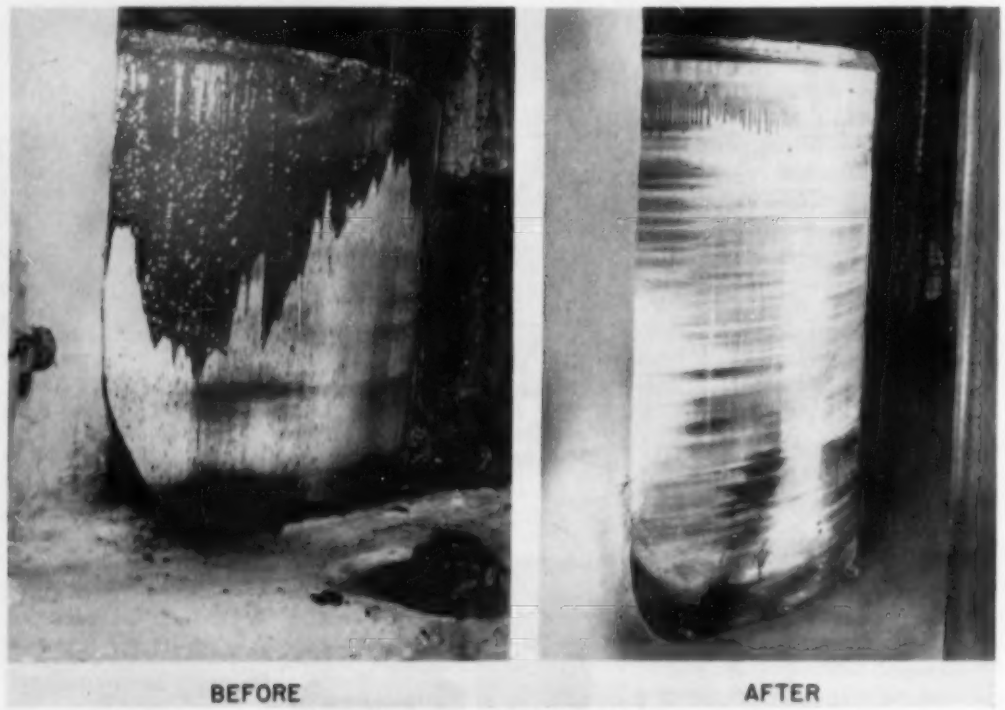
The first Perkins L4M diesel marine engine to arrive in the United States from England is now on display at the showroom of the distributor, Paul E. Keeney Co., 1125 S.E. Grand Ave., Portland, Oregon. The Perkins L4M Series is now available with American made Snow-Nabstedt or Capitol reverse and reduction gears. According to the manufacturer, F. Perkins Ltd., the Perkins L4M is the lowest priced marine diesel engine of its specification and power in the world. The L4 has hitherto been supplied for agricultural and industrial application; but now, it has been redesigned and adapted for marine use with a 269 cubic inch displacement and developing 58 hp at 2,000 rpm.

The L4M four cylinder engine is a useful addition to the Perkins range of marine diesel engines with horsepowers up to 100. The Perkins L4 features of simplicity, accessibility, ease of maintenance and press button cold starting, when coupled with complete freedom from fire risk, dependability and economy of diesels and increased cruising range are of particular value to operators of marine craft. Additional shipments of these Perkins L4M marine diesels will soon be available from dealers of the distributor for the Western States.

SPECIFICATIONS

No. or Model—Perkins L4M.
Type—High Speed.
No. of Cylinders—4 in-line.
Bore and Stroke—4¼ in. bore, 4¾ in. stroke.
Piston Displacement—269.5 cu. in.
Horsepower—
Maximum bhp—58.
at specified rpm—2000.
Weight: with reverse gear—approx. 1200 lbs.
Length Overall—40⅛ in.
Reverse and Reduction Gears—Snow-Nabstedt, Capitol.
Width Between Bearing Centers—19 in.
Height Above Shaft—27 in.
Depth Below Shaft—10⅞ in.
Torque—180 lbs./ft.

Lubricant for Large Marine Engines



Piston skirt of cylinder No. 4 of a Doxford engine before and after using the new emulsion-type lubricant. Alexia Oil A, right, reduces formation of contaminants which cause piston rings to seize or liners to wear excessively.

A new emulsion-type lubricant, developed by Shell Oil Company engineers, is said to reduce the wear of cylinder liners of large two-stroke marine diesel engines by as much as 70 per cent. Extensive Shell laboratory and field tests show that through the use of a water phase in the lubricant, Alexia Oil A permits the introduction of much larger quantities of alkaline additives than are possible with even the best of heavy-duty engine oils. Thus, the new lubricant remains active for longer periods of time and neutralizes more of the harmful combustion acids.

Alexia Oil A has made it possible for several deep-sea fleets to burn residual oil. Although considerably cheaper than the normal grades of fuel oil, residual oil has not been used much in the past because of its high sulfur content. It forms a much greater percentage of combustion acids than do the regular fuel oils, and many lubricants are not capable of neutralizing these acids. Cylinder liners then begin to wear immediately, particularly in 2-stroke diesel engines. Where cylinder liners would usually last from eight to ten years, their life is shortened often to less than three by burning residual fuel. However, with the new emulsion-type lubricant, the corrosive wear of combustion products can be practically stopped, and normal cylinder liner life is again achieved, according to Shell. Alexia Oil A not only prevents liner wear, but also keeps combustion-zone engine parts much cleaner.

New York District Sales Manager

William J. Vonah

The Erie Forge & Steel Corporation announces the appointment of William J. Vonah as District Sales Manager of its New York Offices. Immediately prior to his association with Erie Forge & Steel Corporation, Mr. Vonah held a similar post with the Camden Forge Company. The New York Offices of the Corporation at 90 West Street were moved on May 1st to 60 East 42nd Street, Suite 2339, New York 17, New York. The new telephone number is OXford 7-5323.

Elected Vice-President

Richard E. Whinrey

Richard E. Whinrey, General Manager of Link-Belt Company's Ewart Plant in Indianapolis, has been elected a vice-president of the company, it was announced recently at the company's executive offices in Chicago, by Robert C. Becherer, president. A native of Muncie, Indiana, Whinrey is a graduate of Purdue University with a bachelor of science degree in mechanical engineering and has been with Link-Belt since 1925. He rose through the estimating and manufacturing departments of the company's Dodge Plant in Indianapolis to become assistant general manager in 1949, and the following year assumed similar duties at the Ewart Plant, also in Indianapolis. The Dodge Plant produces ball and roller bearings and the Ewart Plant manufactures power transmission chain and sprockets. Whinrey became general manager of the Ewart Plant in 1951 succeeding Robert C. Becherer, who was elected executive vice-president prior to his elevation as president of Link-Belt Company.

New Central Regional Sales Manager

William E. Dobbins

William E. Dobbins has been named Central Regional Sales Manager by Clark Bros. Co., Olean, New York, one of the Dresser Industries. In his new position, Mr. Dobbins will coordinate the activities of the Houston, Tulsa and Chicago offices and will make his headquarters in Houston. For the past 25 years, he has managed the Clark Bros. and Dresser Industries office in Washington. He also has been a special representative for Clark in the New York City area. To his new post with this manufacturer of engines, compressors and gas turbines, he brings a broad acquaintanceship and a wealth of experience in the petroleum and natural gas industry.

Next time take the strainer basket out of the bucket of kerosene before you give it the heave-ho.

MANZEL

FORCE FEED LUBRICATORS

• Used by Leading Diesel Engine Builders because of their Dependable Operation through Years of Hard Service.

Professionally qualified engineering representatives throughout the country.

Manzel

DIVISION OF
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CAN YOU TOP THIS? 99.95% WATER REMOVAL FROM DIESEL FUEL. TRAPS TREMENDOUS DIRT LOAD TOO!

THIS NEW BRIGGS, DUAL-USE, SINGLE-STAGE FILTER/SEPARATOR IS DOING AN AMAZING JOB ON EVERY INSTALLATION.

STOP INJECTOR PITTING and corrosion, once and for all . . . lick the headaches of down-time due to abrasion . . . with the best FILTER and WATER SEPARATOR you can buy—all in one single compact unit. COMPLETE PROTECTION for all engines in ONE OPERATION with the special fiber-glass filter/separator element.

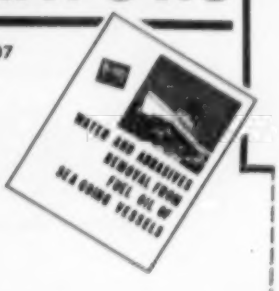
ONE tank does BOTH jobs!

USE THE COUPON BELOW TO GET ALL THE LATEST DATA ON THIS VITAL SUBJECT.

Briggs
PIONEERS IN MODERN OIL FILTRATION

FILTER/SEPARATORS

THE BRIGGS FILTRATION COMPANY, DEPT. 107
RIVER ROAD, WASHINGTON 16, D.C.



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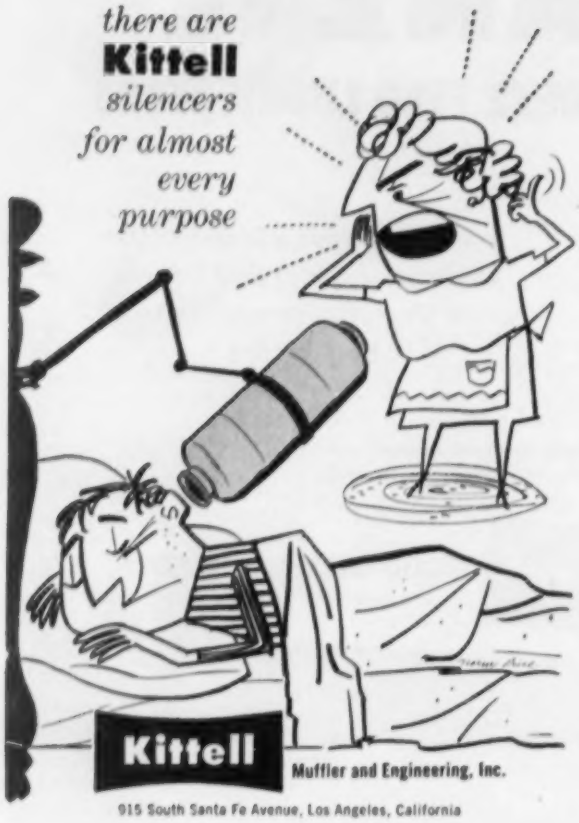
there are **Kittell** *silencers for almost every purpose*



Kittell Muffler and Engineering, Inc.

915 South Santa Fe Avenue, Los Angeles, California

FREE to Every Shop Operator

- Diesel Compression Testers
- Nozzle Testers for American Bosch, Caterpillar and Bendix Nozzles
- Cummins Injector Tester
- International Harvester Injection Testers
- General Motors Injector Testers
- Injection Pump Calibrating Stands
- Nozzle-Injector Cleaning Tools and Lapping Blocks
- Engine Overhaul Stands
- Engine Removal and Parts Dollies
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76 Pages—275 Illustrations
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26 Parts Lists

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Municipal Power Plant

Relies on **Young** *Coolers*

Young Horizontal Core Radiators cool jacket water serving the 3 power plant engines.

Fairbanks-Morse 960-HP O-P Dual-Fuel engines supply power and light to Brockenridge, Pa.

Young "HC"® Units
Cool Dual-Fuel Engines

Another example of Young-preference when it comes to *dependable performance required!* When Brackenridge, Pa., built its own power plant rather than buy from expensive and impractical outside sources, this community wisely specified dual-fuel engines cooled by Young radiators. Effective and efficient use of fuels, gas and oil, enables the power plant to operate with sizeable savings to Brackenridge.

Young HC Horizontal Core units are available for water, oil, gas cooling and steam and vapor condensing in any combination. HC features include, (1) low speed fan gives high efficiency performance at minimum horsepower requirements and low operating cost, (2) vertical air discharge provides even air distribution—eliminates air recirculation and effects of cross winds, (3) compact Young design permits space-saving, in-line installations of 2 or more units for additional capacities and services. Young HC units combine *efficiency, economy, versatility.*

Write for Free Catalog No. 550 Dept. 406-F

Put *Young Talent* to work for you . . .

Solving heat transfer problems is what we do best because it is our very reason for being. You, too, can harness the power of Young engineering talent. Write, wire or call without obligation.

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Creative HEAT TRANSFER ENGINEERS FOR INDUSTRY
Heat Transfer Products for Automotive, Aviation and Industrial Applications. Heating, Cooling, Air Conditioning Products for Home and Industry.
Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Mattoon, Illinois

Mobile Diesel Unit

As Florida approaches its annual hurricane season, the Detroit Diesel Engine Division of General Motors is holding a series of demonstrations of their mobile emergency standby electric generator set through the State for city officials and business firms. The equipment consists of a 6 cyl. GM diesel model 6043-C with a 100 kw Delco generator; switches and automatic controls are all on the truck for convenient hook-up and observation.

Bob Sickinger of Detroit Diesel Division and Ken Ferry of the Miami, Florida branch are shown demonstrating the GM, mobile emergency generating plant to Mayor Henry Milander of the City of Hialeah, Florida.

Officers Elected

Robert H. Morse III

J. F. Weiffenbach

D. L. Harwood

At the meeting of the Board of Directors held recently three new officers were added to the official family of Fairbanks, Morse & Co. These are: Robert H. Morse, III, formerly Sales Manager, who was elected Vice President—Sales; D. L. Harwood, formerly General Purchasing Agent, who was elected Vice President—Purchases; and J. F. Weiffenbach, formerly Chief Product Engineer, who was elected Director of Engineering. All three of these men have been with the company for many years in various executive capacities, and their respective abilities were recognized by the Directors of the company.

Mr. Robert H. Morse, III was, for a number of years, General Manager of the company's Beloit, Wisconsin works, and later he was appointed Assistant to the Vice President in charge of Sales, which position he held for a number of years and was then promoted to Sales Manager.

Mr. D. L. Harwood has spent most of his life in the company's Purchasing Department as Buyer, Purchasing Agent and Manager of Materials and Schedules at the Beloit Works of the company. On January 1954 he was appointed General Purchasing Agent with headquarters in Chicago, which position he has held until the time of his present election to a Vice Presidency.

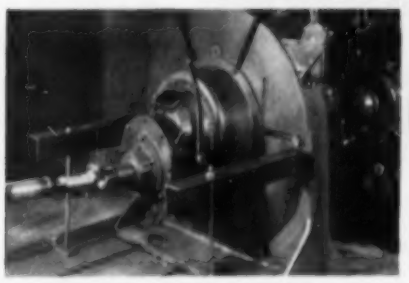
Jack Weiffenbach joined Fairbanks, Morse & Co. a number of years ago as Chief Engineer of the company's Diesel Locomotive Division. He later became Manager of Engineering at the Beloit Works, then Vice President in charge of Manufacturing of the Canadian Locomotive Company, Kingston, Canada, and then Works Manager of the same plant. In January of '53 he was appointed Chief Product Engineer with headquarters at Chicago, which position he has held until his present election to the position of Director of Engineering.

Other officers elected at the same board meeting of the company include the following: Robert H. Morse, Chairman; Robert H. Morse, Jr., President; R. B. Craig, Vice President; J. A. Cuneo, Vice President and Assistant to President; L. R. Gaiennie, Vice President—Personnel; O. S. Leslie, Vice President—Manufacturing; G. J. Malone, Vice President and Comptroller; V. H. Peterson, Vice President—Railroad Sales; L. W. Stolte, Vice President and Treasurer; A. L. Stoddard, Secretary; R. D. Brown, Assistant Secretary and Assistant Treasurer; E. T. Sandeen, Assistant Secretary.

ROCKFORD

MEMO
Clutch must be conservatively rated—

ROCKFORD POWER TAKE-OFFS are designed for generous overload capacity within the fields of service recommended by Rockford Clutch engineers.



Large ROCKFORD clutches, power take-offs and speed reducers are tested for torque, engaging pressure, release, temperature, gear strength, bearing endurance and clutch facing wear on this 400 H. P. diesel powered, electric dynamometer. Let ROCKFORD engineers utilize this machine to improve your heavy-duty power transmission controls.

ROCKFORD
Clutch Division
BORG-WARNER
1321 Eighteenth Ave., Rockford, Ill.

CLUTCHES

Piston Seal

A special type of piston seal has been developed for applications where flange parting surfaces must form a metal to metal joint. Called a Class 3 Bellofram, the new seal is one of four distinct types of long stroke, deep convolution, constant area diaphragms which simplify both design and manufacture of pressure sealed mechanisms. In design the new Bellofram employs a flange with a clamping bead on its lower surface. Typical uses of a metal to metal flange contact include cases where through bolting would exert excessive forces on the Bellofram flange, causing extrusion; where flange perforation and positioning over stud or tap holes would be awkward; or where uneven clamping forces result in an undesirable non-parallel condition between the cylinder and its mating part.

Class 3 Belloframs are available in more than 80 standard sizes, for bores from 1 in. to 6 in. in diameter. Elastomer-fabric combinations range from Nitrile Rubber and Nylon to Silicone Rubber and Dacron. Special compounds for unusual service applications, as well as semi-standard sizes, are also available to meet user's requirements. Complete specifications, design data and installation information are available on request from the manufacturer, Bellofram Corporation, Burlington, Massachusetts. (ITS NEW)

Temperature Resistant Paint

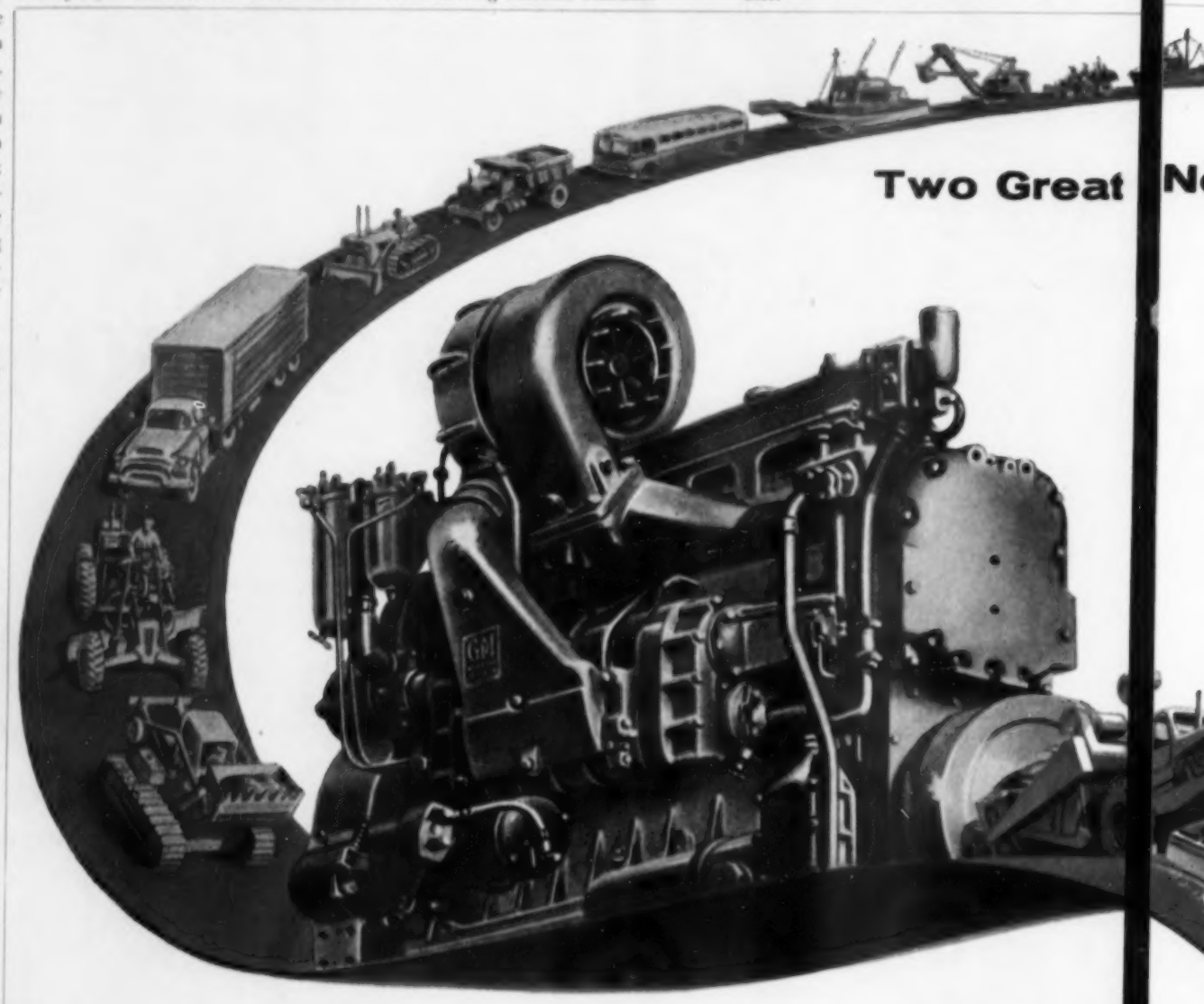
Development of a ceramic frit, silicone resin type paint capable of withstanding temperatures up to 1400° F. without significant deterioration or loss of protective properties is described in a report of research by the Army Corps of Engineers just released to industry through the Office of Technical Services, U. S. Department of Commerce. The paint was needed by the Army to reduce the accelerated oxidation and rapid destruction of steel components which, under normal conditions of use, are heated to high temperatures in oxidizing atmospheres, such as mufflers and manifolds.

Commercial heat-resistant paints were evaluated and none of these was adequate. Experimental investigations revealed that paints consisting of a blend of ceramic frits, pigments, and refractories at a pigment volume concentration of 35 to 40 percent, with a frit to pigment and refractory ratio of 3 to 1, were superior to commercial paints pigmented with metallic powders. After development of the paint, a procurement specification was prepared ,which is included in the report. This report PB 111957 *Development of Heat-Resistant Paints*, M. Kornbluth, Corps of Engineers, U. S. Army, may be ordered from OTS, U. S. Department of Commerce, Washington 25, price $4.

Assistant Manager

Announcement is made by The Trane Company, manufacturer of air conditioning and heating equipment, that Randall W. Johnson has been named Assistant Manager of the company's Transportation Sales Department. Johnson, who has had extensive experience in the department, will be in charge of transportation air conditioning and refrigeration equipment sales work with the company's eastern sales offices having railroad accounts.

Gerald E. Hicke, manager of the department will devote his time to the heavy concentration of railroad accounts handled by Trane sales offices located in the middle and far western sections of the country. It is expected that Johnson's promotion and subsequent activity will allow for an expanded sales operation on the product line.



Increased Power—Decreased Fuel

Here's exciting news for power users—great new 4- and 6-cylinder GM Detroit Diesel engines that represent another long forward step by the leader in the Diesel engine field. With this new, more efficient Detroit Diesel Turbopower you can have up to 17% more power with no increase in fuel consumption—or the same power output with fuel saving up to 15%.

Detroit Diesel engineers have Turbocharged 2-cycle Diesels by combining an exhaust-driven turbine with the engine blower to deliver a larger supply of fresh air to the cylinders. Result: improved combustion, freer engine breathing, quieter and more efficient performance in the higher speed ranges.

Turbopower Diesels are additions to Detroit Diesel's time-proved Series 71 line, world's most widely used Diesel engines. The four-cylinder Turbopower Diesel delivers 171 H.P. at 2300 R.P.M.; the six-cylinder engine produces 280 H.P. at 2300 R.P.M.

To truckers Turbopower means speedier, more economical movement of big payloads.

To boatmen it means faster speed or longer cruising range—more room for cargo.

To contractors and other industrial users it means greater work output from higher-powered engines or improved economy.

For the full story of 2-cycle Turbopower, write us or call your nearest GM Detroit Diesel Distributor or Dealer.

AMERICA'S LARGEST BUILDER OF DIESEL ENGINES

A major supplier of air conditioning and refrigeration equipment, Trane in 1955 had the biggest sales volume on this line of equipment in its history. Within the last year, the company supplied railroad equipment for Rock Island and New Haven "Talgo" trains; Santa Fe for its "El Capitan Hi-Level" trains and reefer cars; Northern Pacific for use on the railroad's "North Coast Limited" trains; Great Northern for its "Empire Builder" passenger cars; Northwestern for dome coaches and lounge cars; C. B. & Q. for its "Denver Zephyr" cars; and Canadian Pacific and Canadian National for their passenger trains.

In the development stage, Trane has been working on new city bus and subway car air conditioning systems. Also included in the new application program are cooling systems for suburban double-deck cars in which several well-known railroads have an interest.

Drott Folder

Versatility of the International Drott Skid-Shovel is shown in a new eight-page, two-color mailing folder now available. Featured are the Skid-Shovel's five chief advantages, listed as the "pry-over-shoe" breakout, skid-shoe action, description of its depth-gauge indicator for straight-forward loading, parallelogram raise action, and the shock-swallowing protection of its patented Hydro-Spring.

Also described are the use of a variety of attachments, among them the rock fork, bullangledozer blade, log and pulpwood rack, combination rack, scarifier,, grubber blade, and buckets. Skid-Shovels are available in three sizes: 1 to 2¼-yd. capacity. Ask for booklet CR-407-F, Consumer Relations Department, International Harvester, 180 North Michigan Ave., Chicago 1, Ill.

Portable Water Cooler

A unique, portable water-cooling tower, developed by Badger Manufacturing Co., Cambridge, Mass., may well prove to be the answer to a number of industrial situations where limited cooling water supplies have been a production bottleneck. The Badger unit is a complete package plant on wheels. Compact and lightweight, it is equipped with all necessary accessories such as pumps, strainers, electrical control equipment, pressure gauges, thermometers and feed water conditioner. Design capacity of the unit is 240 gal. per min. of 115 deg. F water reduced to 90 deg. F when operating at 95 deg. F air temperature and 80 deg. F wet bulb.

The tower is presently being used in conjunction with portable oxygen-generating plants in remote locations. According to Badger, the unit may well answer a need in many water-starved plants at home and overseas. Small chemical plants could use it. So could a small diesel generating station with large volumes of cooling water to recirculate.

The tower is constructed of steel and is packed with 20-in. fiberglas. The entrainment separator is a special copper mesh, and the four axial flow fans have a capacity of 11,000 cfm each. The entire plant can be shipped as a unit.

★

Carbon makes up about 85% of the fuel burned and it sometimes seems that most of it got stuck behind the rings.

IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 21 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, 816 N. La Cienega Blvd., Los Angeles 46, California.

New Engines Added

to General Motors 2-cycle Diesel Line

Detroit Diesel Turbopower

Gulf Coast Diesel Notes

By Michael T. Pate

DIXIE DRILLING COMPANY, Houma, Louisiana, has bought through Bethlehem Supply Company and from Waukesha Sales & Service, Inc., of Houston, 9 Waukesha diesels which will be used on an offshore oilwell drilling rig. The order included four model 6-LRDBSU engines rated 490 hp. at 1100 rpm; 3 model 6-WAKDBU diesels rated 209 hp. at 1600 rpm; one model 148-DKBU rated 174 hp. at 1800 rpm; and a model 135-DKU rated 106 hp. at 1800 rpm. The two last listed diesels will be used for ac power generation on the rig, while others will power the drilling equipment and mud pumps.

TEXAS CREOSOTING COMPANY, Houston, Texas, has repowered a 15-ton Orton locomotive crane with a General Motors torque converter equipped series 71 model 3082 diesel generating unit, rated at 90 hp. The unit was secured from Stewart & Stevenson Services, Inc., of Houston.

CENAC TOWING COMPANY, Houma, Louisiana, has bought from Cummins Sales & Service, Inc., of Fort Worth, Texas, two model NHMS-600 Cummins diesels, rated 275 hp. each, which will be installed in a work boat.

COLLINS CONSTRUCTION COMPANY, Port Lavaca, Texas, has obtained from Stewart & Stevenson Services, Inc., Houston, three General Motors series 71 torque converter equipped model 4082 diesels. The three 110 hp. engines will be installed in as many drum hoists in the company's marine pipelaying equipment.

HARMS & SMAIWALL Shipyards, Inc., Orange, Texas, has bought from the Diesel Division, Fairbanks-Morse & Company, three model 45, 5¼ hp. generating sets each using a single-cylinder F-M diesel.

CIRCLE DRILLING COMPANY, Eunice, Louisiana, has secured from Waukesha Sales & Service, Inc., Houston, three model VLRDBSU Waukesha diesels, rated 1016 hp. at 1100 rpm., the engines to power a diesel-electric drilling rig. The company also bought two model 6-NKDBSU 342 hp. 1100 rpm. Waukesha diesels to be used on as many generator sets.

H. R. NORTHAM COMPANY, Houston, Texas, has bought from Big 3 Welding Equipment Company, Fort Worth & Houston, two 250 amp. type S-9660 welding generators, each powered by a 40.5 hp. model DIX4D, 4-cylinder Hercules diesel.

T. & N. O. RAILROAD, Houston, Texas, has bought from Stewart & Stevenson Services, Inc., of Houston, a series 71 torque converter equipped, 180 hp. General Motors diesel unit, which will repower an American locomotive shovel.

STANOLIND Oil & Gas Company, Houston, has bought from Allis-Chalmers Manufacturing Company, Buda Division, Houston, four model BD-77 diesels. The engines, developing 12 hp at 1600 rpm., will serve as drives for water pumps.

BECK OIL COMPANY, Houston, Texas, has obtained two General Motors series 110 twin-6 model 122403 diesel units, rated 500 hp. each, which will be used to drive a Bethlehem M58 drawworks compound for a drilling rig. The diesels were furnished by Stewart & Stevenson Services, Inc., of Houston.

HOUSTON CONTRACTING COMPANY, pipeline contractors of Houston, have bought from Big 3 Welding Equipment Company, Houston, three 300 amp., type S-7068, Lincoln welding generators, each powered by a series 71, model 2055 General Motors diesel.

IDECO, Beaumont, Texas, a division of Dresser Industries, Inc., has bought forty Stewart & Stevenson model 3GD-30, 30 kw. ac generating sets, each powered by a series 71, model 3030C General Motors diesel.

DYER & SMITH, New Iberia, Louisiana, have bought from Waukesha Sales & Service, Inc., Houston, Texas, three model 6-LRDBU Waukesha diesels, rated 368 hp. each at 1100 rpm. The diesels will be used on an offshore oilwell drilling rig.

MORGAN'S, INC., of Savannah, Georgia, has bought a Stewart & Stevenson model 2GD-20 Special 20 kw. ac generator set equipped for completely automatic operation to maintain charge on a bank of 120-volt storage batteries.

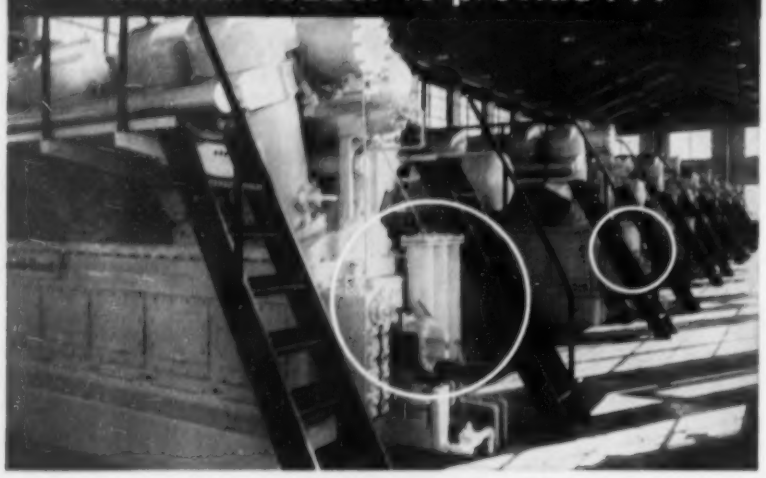
PORT ARTHUR STEVEDORES, of Port Arthur, Texas, have placed in service two model DT6-317 Allis-Chalmers diesel generating sets, rated at 30 kw. each. The units will be used to power steel-handling magnets in the company's operations. The diesels were furnished by Buda Division, Allis-Chalmers Mfg. Co., of Houston.

MOSER RANCH, DeKalb, Texas, has secured from Stewart & Stevenson Services, Inc., of Houston, a vertical model General Motors 3-cylinder series 71 diesel which will power a Cascade turbine pump, mounted on a barge. The equipment will be used for pumping water from Red river for crop irrigation.

SHARP DRILLING COMPANY, New Iberia, Louisiana, is installing three model 6-LRDBSU Waukesha diesels on a new drilling barge. The diesels, rated 490 hp. each at 1100 rpm., were obtained from Waukesha Sales & Service, Inc., Houston.

WRIGHT TOWING COMPANY, Beumont, Texas, has secured from Stewart & Stevenson Services, Inc., Houston a General Motors series 110, 6-cylinder marine propulsion unit incorporating a diesel with hydraulic reverse and reduction gear, 4.5:1 ratio, which is being installed on the 48-foot steel towboat *"Dowco."*

NUGENT FILTERS teamed with another leader to provide . . .



. . . TOP ENGINE EFFICIENCY

• Shown above is a view of six Ingersoll-Rand, 1320 h.p. gas engine compressors installed for service at United Gas Pipe Line Corporation's Needville (Tex.) station.

And here's top recommendation! All 6 powerful units feature the surest and most reliable filtration units available . . . NUGENT LUBE OIL FILTERS!

These mighty I-R units are used to boost gas to 900 PSIG discharge pressure on a new 30" line. Nugent Filters present the engine's first line of defense. They keep the lubricating systems free from harmful impurities because Nugent filter elements are designed to *catch practically everything!* By providing 20 times more filtering area than other filters of comparable size, Nugent Filters make possible greater filtering *action* and *more effective* filtration to insure longer engine life. Filters of the above type are easy to install . . . require no intricate piping . . . operate flawlessly and work perfectly in conjunction with any engine's overall lubricating system. They are available in full flow or by-pass with the same unit.

You can see low cost, dependable Nugent Filters on expensive machinery everywhere. Expensive machinery? We mean big or small diesel engines, gas engines, turbines, compressors, etc. On such equipment, manufacturers select and install, AS ORIGINAL EQUIPMENT, Nugent Filters. If you have a filtering problem, follow this advice—GET the surest, most effective filtration your dollars can buy. GET Nugent Filters for TOP engine performance. Write for full information.

Nugent Duplex Oil Filter. These filters are also available in Triplex Models.

Wm. W. Nugent & Co., Inc.
3441 Cleveland St. Skokie, Illinois

OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

Established 1897

Representatives in Boston • Cincinnati • Detroit • Houston • La Junta, Colo. • Los Angeles Minneapolis • New Orleans • New York • Philadelphia • Portland, Ore. • San Francisco Seattle • St. Louis • Tulsa • Representatives in Canada: Montreal • Toronto • Vancouver

HOUSTON Oil Field Material Company is equipping three centrifuging machines, used for purifying oilwell drilling mud, with as many model 135-DKU Waukesha diesels, rated 106 hp. at 1800 rpm. The engines were furnished by Waukesha Sales & Service, Inc., of Houston.

WORLD WIDE Supply Company, Houston, will export to Israel a Stewart & Stevenson Oilfield Utility Unit, comprising a 30 kw. ac generator unit, General Electric 200 amp. arc welder, and Worthington 17 cfm.air compressor. Air compressor and arc welder are driven by electric motors. The 30 kw. generator, furnishing power for the motors, is driven by a General Motors series 71, 3-cylinder model 3030C diesel.

SALT WATER CONTROLS, New Iberia, Louisiana, has bought from Waukesha Sales & Service, Houston, two model 190-DLCU Waukesha diesels, rated 71 hp at 2200 rpm.

ESSO STANDARD OIL Company, New York City, has secured for export five Stewart & Stevenson model 2GD-20 20 kw. ac generating sets each powered by a General Motors series 71, 2-cylinder model 2030C diesel.

POWER RIG Company, Lake Charles, Louisiana, will use three model 6-LRDBU Waukesha diesels, rated 368 hp. each at 1100 rpm., on an offshore drilling rig. The diesels were sold by Waukesha Sales & Service, Inc., Houston.

Eight New Trucks Delivered

Delivery has been completed on an order of eight new Kenworth trucks to Johnson and Sons, Inc., of Provo, Utah, it is announced by R. D. O'Brien, vice president in charge of sales for Kenworth Motor Truck Company of Seattle. Johnson and Sons, Inc., buy and sell grain and produce. Four of the new trucks are conventional Kenworth Model 825 units with sleeper cabs. Four Kenworth 825 Cab-Over-Engine units also were ordered by the firm. All the trucks are powered by 250 hp. turbocharged Cummins NTB diesel engines.

Engineered for lightweight, all trucks in the order have Kenworth's torsion spring tandem axle drive and many aluminum components including frame and cross members, fuel tanks, battery boxes, cabs, bumpers, running boards and wheels. Founded by Jesse Johnson, a trucking pioneer in the Intermountain area, who has been in the industry for 35 years, Johnson and Sons, Inc., operates from California to Nebraska including the intermediate states. The sale was handled by Kenworth Sales Company, Inc., Kenworth distributors at Salt Lake City, Utah.

New Eastern Office

We have relocated our Eastern Headquarters since the fire that we mentioned on page 71 of the May, 1956 issue of DIESEL PROGRESS. Our new address is 184 Sunrise Highway, Rockville Centre, New York. The phone remains the same: namely Rockville Centre 6-6344. Robert K. McQuiston and Arnold B. Newell are now operating from this new office.

DIESEL PROGRESS

Research Vessel

Recently research on Virginia's fisheries was given a boost when the keel was laid for a new fishery research vessel at Dunn's Marine Railway, West Norfolk. Designed by George E. Meese, Naval Architects and Marine Engineers, of Annapolis, Maryland, in consultation with the staff of the Virginia Fisheries Laboratory, Gloucester Point, the new boat will be similar in her general lines to a southern shrimp trawler. The chief features of difference from the typical shrimp trawler will be an engine room situated aft, in the space usually used as a fish hold, living quarters and galley below decks forward of the engine room, and a roomy laboratory on deck immediately aft of the wheelhouse.

The new boat will replace the old "Virginia Lee" which is considered unseaworthy for continued service. To carry on effective studies of Virginia's fisheries it is necessary to ride out the sudden storms that lash the waters of Chesapeake Bay, and to investigate conditions over the continental shelf outside the Capes. "The new boat will make it possible for us to conduct surveys that were impossible with our present vessel," said Dr. J. L. McHugh, Director of the State Laboratory. "We hope to improve the efficiency of our present surveys of the distribution and abundance of migratory fishes, crabs, and other marine animals. We hope also to learn how conditions in the ocean affect the supply of seafoods within the Bay. We will be equipped for trawling and dredging in fairly deep water, and will have special equipment for studying the microscopic animals and plants that are so important as food for the larger marine animals. Ample deck space will be available to handle all types of fishing and scientific gear."

Designed for offshore service as well as for inshore waters of the State of Virginia, the dimensions of the vessel are: length overall 55 ft., 3 in.; length at water line 51 ft., 8 in.; beam 16 ft. 8¼ in.; and draft 5 ft. A single-engine, heavy-duty type of fishing vessel, she will be powered by a Caterpillar D326 diesel marine engine which develops 120 hp at 1600 rpm with Twin Disc Hydro-Troll, with a variable fill arrangement and 2.96:1 reduction gear ratio. The Hydro-Troll gear allows propeller slippages up to 60 per cent to obtain almost zero hull speed for certain types of research fishing. The generator will be an Onan auxiliary diesel which also drives a special service Barnes pump. The electrical system will be a fully floating 32 volt dc system for engine starting, power and lighting services installed to suit National Fire Prevention Association standards.

Self-Propelled Power Plant

Initial shipments of self-propelled electric power plants for servicing U. S. Navy aircraft currently are being made by Consolidated Diesel Electric Corporation under contracts totaling nearly $8 million, Norman I. Schaller, president, announced recently. The NC5-A mobile power plants are destined for Naval Air Stations throughout the world.

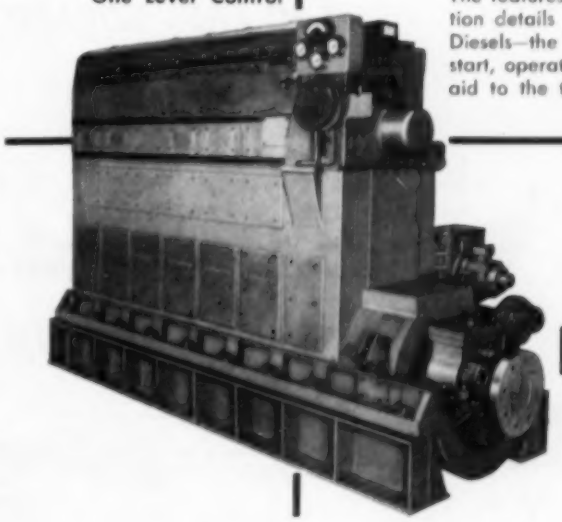
The units are new models, and incorporate latest improvements over the Consolidated Diesel NC5's which are in service for the Navy throughout the world. The NC5-A's are highly mobile, self-contained sources of ac and dc electric power for starting, servicing, and towing aircraft and related equipment. The power plant consists essentially of a heavy duty dc generator, a 30 kva, 400 cycle ac alternator, rectifier together with associated controls and output cables mounted on a specially designed all-wheel drive chassis. The generators are driven by the same diesel that propels the vehicle.

Compact
High Output
Less Weight Per HP
Low Piston Speed
Low Fuel Consumption
Low Noise Level
Positive Reverse
One Lever Control

Kahlenberg NEW TURBOCHARGED TWO STROKE DIESEL

- Starts and operates at all speeds without blower or other aids.
- Welded base and frame construction for high strength and low weight.
- Crankshaft bedded in base for greater rigidity and easy accessibility.
- Individual cylinders—no warped or cracked blocks.

The features enumerated above are only a few of the outstanding construction details of the new ultramodern Kahlenberg high output turbocharged Diesels—the only two stroke turbocharged Diesels available in America that start, operate, and maneuver without any blower, scavenge pump, or other aid to the turbocharger.



Kahlenberg Model E series Diesels are offered for marine or stationary service in units from four to eight cylinders, conservatively rated 400 to 1100 BHP, 300 to 400 RPM rated speed range, and direct reversible for marine use.

Write for additional information, giving details of your power requirements.

KAHLENBERG BROS. CO.

1200-1300 Monroe Street, Two Rivers, Wisconsin

MANUFACTURERS OF KAHLENBERG DIESELS, AIRHORNS, PROPELLERS, AUXILIARIES

Company Elects

John L. McCaffrey today was elected chairman of the board of directors and chief executive officer of International Harvester Company, at a special meeting of the board of directors. At the same time, Peter V. Moulder, formerly executive vice president, was elected president of the company to succeed McCaffrey. Frank W. Jenks, formerly vice president in charge of merchandising services, was elected executive vice president. Harry O. Bercher, formerly vice president in charge of the steel division and purchasing and traffic, was elected executive vice president. McCaffrey announced also that Christian E. Jarchow, executive vice president since 1952, will continue to serve in this present executive capacity.

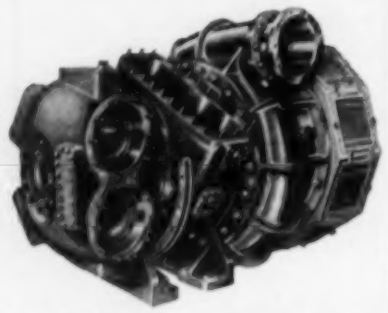
McCaffrey had been president of the Harvester Company since May 16, 1946. His career with the company began in 1909. He advanced through numerous sales executive positions to become vice president in charge of sales in 1940 and executive vice president in 1941. Moulder joined the company in 1910 in sales work and was identified particularly with motor truck sales. When the motor truck division was formed in 1944, he was its first head. He was elected vice president in charge of that division in 1945. He was elected executive vice president in May 1946 and a director of the company in May 1948. He is a member of the executive committee of the board.

Jenks joined the company in 1914 at Richmond, Va., in the district sales office. He progressed through various positions in sales and credit work, becoming manager of the comany's credit and collection department in 1941. He was elected vice president in 1944, and has been a member of the board of directors since 1952. Bercher joined the company in 1928 at its iron ore mines at Hibbing, Minn. He progressed through the steel division to become auditor of the Wisconsin Steel Works in 1937. In 1945 he was appointed assistant to the vice president in charge of the steel division, and later in the same year was appointed general manager of the steel division. In December 1947, Bercher was appointed director of purchasing and traffic in addition to his steel division responsibilities. He was elected vice president in May 1953.

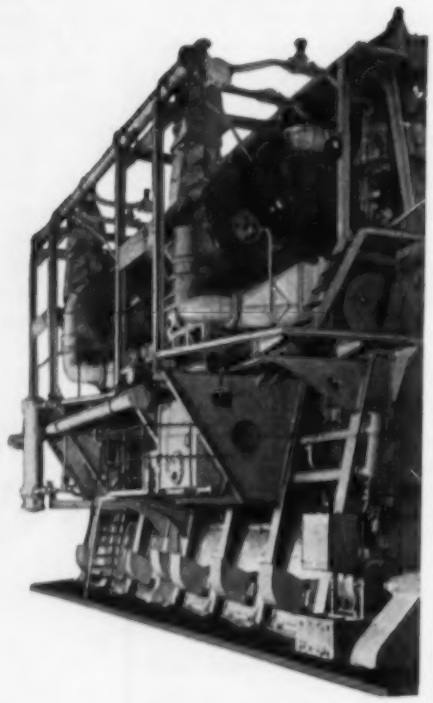
Sales Organization Enlarged

Appointment of a new assistant sales manager, extension of established district offices into two new areas and an overall business increase have resulted in several changes in the sales organization of Minnesota Rubber and Gasket Co., Minneapolis. Richard K. Mattocks, formerly associated with the Illinois Bell Telephone Co., will fill the newy-created assistant's post, aiding Richard G. Wells, the national sales manager. Robert Wilson is now district manager in the New York area, and his new associate is Eugene Fischer, former chief engineer of Drum Equipment Corp.

The Cleveland office, under the direction of William Grotenrath, has been extended to cover Cincinnati and will be serviced by William Grotenrath, Jr. A branch of the St. Louis district office has also been established in Kansas City's Merchandise Mart Building, suervised by Curtis Beem. Harold Moorehead has been named assistant district manager in the active Philadelphia region, after several years with Raybestos-Manhattan and Joseph Glenn & Son and a similar position in St. Louis has been filled by Eugene Raemdonck, formerly with Wagner Electric Co. ▪



Harland & Wolff chose these Napier Turbo Blowers



Two Napier Type MS 600 turbo blowers are fitted to the Harland & Wolff S.A. 6 single-acting two-stroke Diesel which powers the Blue Funnel Line M/S DEMODOCUS. The S.A. 6 is one of the first engines of its type to be successfully turbo pressure-charged without the use of mechanically driven scavenge pumps. Why did Harland & Wolff choose *Napier* turbo blowers? Here are three good reasons—

- Napier blowers have *high adiabatic efficiency*, resulting in maximum power increase and low fuel consumption.
- Journal bearings on the MS 500 and 600 Napier blowers are sleeve type, and with proper lubrication they will last as long as the engine itself. The MS 500 and 600, the largest blowers in the Napier range, are built especially for marine applications.
- A high standard of workmanship is guaranteed by Napier's long experience in precision engineering.

Napier turbo blowers are available in seven sizes for engines of 140-4,000 h.p. afloat and ashore. Multiple installations for engines of higher powers. On 4-stroke Diesels they can double the power, on 2-strokes they increase it by over 30%—often at a lower specific fuel consumption. Napier turbo blowers are currently in use in 69 countries.

for this engine

which powers this ship

NAPIER Turbo-blowers

D. NAPIER AND SON LIMITED · LONDON · W.3 · ENGLAND

Representative: L. O. Brooks Suite 909, Dupont Circle Building, 1346 Connecticut Avenue, N.W., Washington 6, D.C. Tel: Dupont 7-2123

CRC T9

Tip on Lubrication

A diesel engine is a valuable piece of machinery in any plant and while most are designed for extremely rugged service, careful attention should be given to proper lubrication procedures. If excessive bearing wear or failure occurs, the operator should immediately check the following possible causes:

1. Corrosive Oil
2. Contaminated Oil
3. Incorrect Oil Viscosity
4. Water in Oil
5. Insufficient Oil

For High Oil Temperatures Check:

1. Incorrect Oil Viscosity
2. Insufficient Oil
3. Clogged Oil Cooler
4. Clogged Oil Lines
5. Dirt or Sludge in Crankcase

If Crankcase Deposits are found, check:

1. High Oil Temperature
2. Low Oil Temperature
3. Water Leak in Crankcase

In addition to these hazards, improper lubrication may result in sticky rings, combustion chamber deposits, and a lack of power and efficiency.

Checks on Fuel Systems

A little extra time and planning will not only reduce fuel costs for the operator of a diesel engine, but will ensure full combustion efficiency and power. If your daily Log indicates that improper combustion or lack of power is occurring, an immediate check should be made for the following possible causes:

1. Incorrect Injection Timing.
2. Incorrect Injection Pressure.
3. Plugged Fuel Oil System.
4. Fuel Leaks.
5. Sticking Fuel Nozzles.
6. Sticking, worn, or leaking inlet and exhaust valves.
7. Improper or Low Grade Fuel.
8. Water in Fuel.

New Board Member

Louis Fenn Sperry, Vice President of the First National City Bank of New York, today was elected a member of the Baldwin-Lima-Hamilton Corporation's Board of Directors at its Annual Meeting at Eddystone, Pa. Other board members reelected were: Henry Barnhart; H. E. Coombe; Joseph N. Ewing; Edward Hopkinson, Jr.; McClure Kelley (President); Erwin Loewy; William Clarke Mason; James H. McGraw, Jr.; Frederic A. Potts; William Wood Prince; George A. Rentschler (Chairman); Walter A. Rentschler; John J. Rowe; Marvin W. Smith; Milton Steinbach; Ralph K. Stiles; James M. White.

Catalog of Temperature Controls

The Partlow Corporation, 2 Campion Road, New Hartford, N. Y., has announced a new, 8-page condensed catalog containing model illustrations and brief descriptions of Partlow temperature controls and allied equipment for industrial heating and refrigeration. For applications ranging from −30° to +1200°F. Included are Recording Controls, Indicating Controls, Non-Indicating Controls (electrical and mechanical), Thermometers, Bulb Installation Accessories, How to Order Thermal Elements, Process Timers, Saf-T-Flame Gas Pilots. Basic price data included.

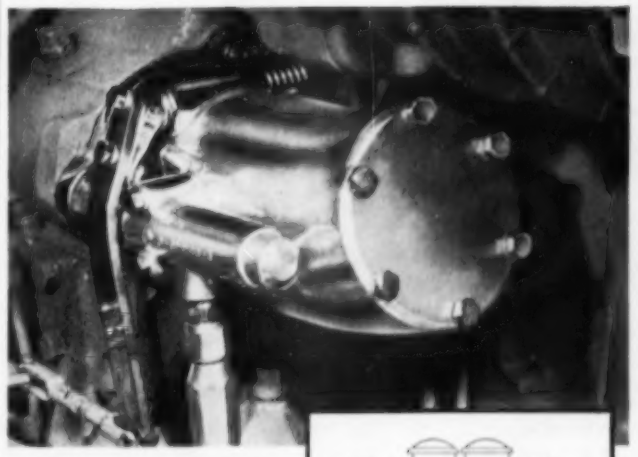
IT'S HERE! JUST OFF THE PRESS! Bigger, better, completely revised, rewritten and brought up to date. It's Volume 21 of DIESEL ENGINE CATALOG, now ready for mailing. Mail orders are now being filled for this giant reference book with its all-new, profusely illustrated engine and accessory sections. Orders are being accepted for this limited edition, which costs $10 postpaid plus California sales tax where applicable. Send checks or company form orders to DIESEL PROGRESS, 816 N. La Cienega Blvd., L.A.

It takes a power shovel

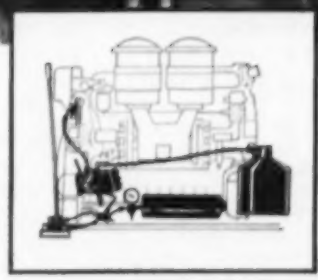
half a second to dump a bucket

But a Hydrostarter starts a GM Detroit Diesel in

One-Third the Time



Heart of the Hydrostarter is this hydraulic starting motor. Other components are an engine-driven pump, accumulator, emergency hand pump and reservoir.



15/100 of a second. That's the split-second it takes a Hydrostarter to start a General Motors Detroit Diesel. And a Hydrostarter cuts your operating costs—costs less to maintain even than regular starting systems. In a recent 26-day test one Hydrostarter started a GM Detroit Diesel 26,788 times. For sure, fast starts even at 20° below zero, specify a Hydrostarter on your next GM Detroit Diesel—or have one installed on your present engine. For more information call your GM Detroit Diesel distributor, dealer or write direct.

DETROIT DIESEL

Engine Division of General Motors • Detroit 28, Michigan

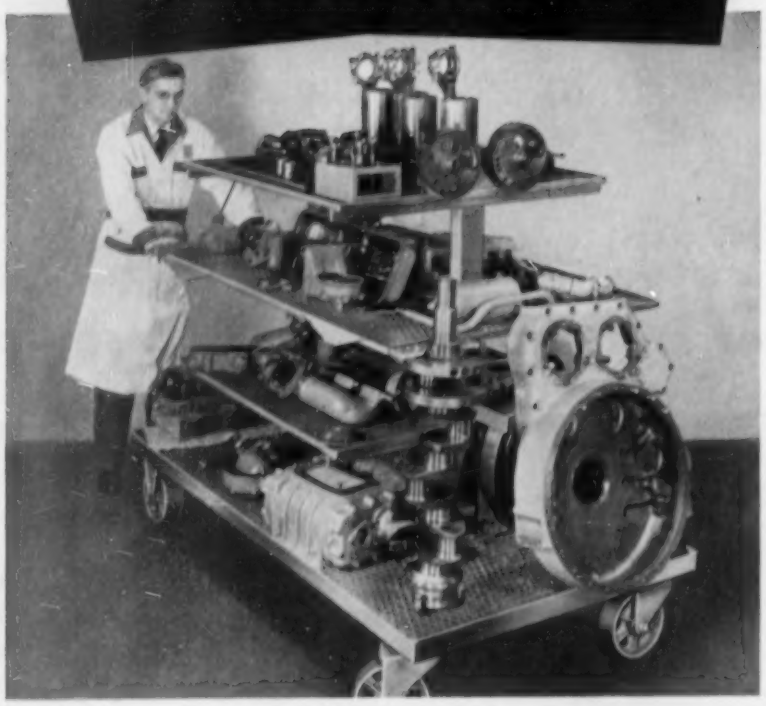
Single Engines . . . 30 to 900 H.P. Multiple Units . . . Up to 900 H.P.

AMERICA'S LARGEST BUILDER OF DIESEL ENGINES

First Quarter Sales

Sales of Cummins Engine Company, Inc., Columbus, Indiana, and its wholly owned subsidiaries during the quarter ending March 31, 1956, were 43 per cent above the comparable period last year, or $24,744,000 as compared to $17,304,000. In announcing the unaudited consolidated sales figures to the Company's shareholders, R. E. Huthsteiner, President, pointed out that income before provision for Federal income taxes for the first three months of 1956 was $2,608,000 and that net income after provision for estimated Federal income taxes amounted to $1,227,000. Earnings per share were $1.41 for the quarter. Figures for the same period in 1955 showed income of $1,948,000 before provision for Federal income taxes; and net income of $889,000 after provision for estimated Federal income taxes. Earnings per share for the first quarter of 1955 were $1.01.

New! COMPACT, PORTABLE KENT-MOORE PARTS RACK SPEEDS DIESEL ENGINE OVERHAUL . . .



Worried about the time and cost factors of repairing your diesel engines? Here's a *real* helper! Kent-Moore—world's largest manufacturer of special engine repair equipment and tools—now offers a versatile new Parts Rack (J-6387) specially designed for Detroit Diesel Engines, Series 51, 71, 110. But it can be easily adapted for *any* diesel engine!

THESE UNIQUE FEATURES

- Over 60 square feet of shelf space—no need to stack precision parts.
- Damage points protected with rubber or plastic.
- Six-inch wheels assure maneuverability: two rigid, two swivel.
- Crankshaft held safely and securely.
- Adjustable holder for crankshaft.
- Convenient bracket holds flywheel securely.
- Space for engine block and head.
- Easily and simply assembled.

OFFER THESE MANY ADVANTAGES

- Convenient temporary rack for engine parts.
- Holds *all* parts of a complete engine assembly.
- Move all parts of a disassembled engine at once.
- Make cleaning of engine parts easy.
- Conveniently positions parts for inspection and assembly.
- Avoids cluttered shop—improves appearance.
- Cleaner parts at time of assembly

Engine manufacturers agree: it's wise to have one Kent-Moore Parts Rack for each engine being overhauled.

Why not investigate the most convenient and versatile Parts Rack ever devised. Write today for price and delivery information.

KENT-MOORE ORGANIZATION, INC.

Dept. D, 1501 So. Jackson St., Jackson, Michigan

ENGINEERS AND MANUFACTURERS OF SPECIAL SERVICE TOOLS AND EQUIPMENT

Locomotive Sales

The Nation's Class I railroads put 399 locomotive units, all diesel electric, into service in the first three months of this year, compared with 306 in the first quarter of 1955. Of locomotives installed in the year-ago period, three were electric and the remainder diesel-electric.

The backlog of new locomotive units on order totaled 859 units on April 1 compared with 428 a year earlier. The backlog included 832 diesel-electric units, 12 electric and 15 gas-turbine-electric units.

Power Steering For Mack Vehicles

Mack Trucks announced today that power steering is available for all its vehicles to increase their safety and to add to their ease of handling. Elliott G. Ewell, Mack vice president, said the Mack hydraulic power steering is of the linkage type, operating on the drag-link in the largest sizes and on the tie-rod in others. These arrangements have the advantage, Mr. Ewell said, of relieving the steering gear of heavy shock loads and of requiring practically no under-hood space. Also, they utilize the standard steering gear.

In addition to reducing driver effort in steering, according to the Mack Trucks official, the company's power steering has the additional virtue of eliminating the danger of loss of control resulting from tire blowouts and road obstructions. Engine-driven pumps supply the fluid pressure required, a balanced vane type being used in the heavier sizes and the eccentric gear type on the others. They are driven either off the end of the generator or by separate belt drives.

Designs for Offshore Platforms

A contract for the design of two types of offshore platforms for obtaining ocean environmental data has recently been completed by Friede and Goldman, Inc., New Orleans, the Navy announced today. The contract was awarded by the Public Works Officer of the Sixth Naval District on behalf of the Chief of the Bureau of Yards and Docks. Preliminary design work and funding of the project was done by the Bureau of Ships.

The platforms differ from the offshore "Texas Tower" platforms in design, size, and purpose. These platforms will house personnel who will study temperature and pressure variations in the sea, salinity factors, thermal gradients, and periods and lengths of ocean waves. The larger of the two types will be erected in 100 feet of water approximately 12 miles off the coast, with a platform 40 feet above the water line. The smaller type will be located in 60 feet of water approximately 2½ miles off the coast, also with a platform 40 feet above the water line.. The lower deck of the platform will in each case clear the crests of hurricane waves.

Both types will be equipped with diesel electric generators, auxiliary machinery, heating, ventilation, galleys, refrigeration and crews quarters. Helicopter landing decks, radar and communications facilities will also be provided. The larger platform will have sleeping accommodations for thirty persons; the smaller will accommodate four. The Sixth Naval District Public Works Officer, Charleston, South Carolina, will request bids for construction of the platforms upon acceptance of the completed designs. The platforms will be erected off Panama Cith, Florida, in the latter part of 1956 or early 1957. They will be operated under the management control of the Bureau of Ships.

Two Engineers Promoted

The promotion of M. J. Helmich and E. J. Fithian, Jr. in its locomotive engine program has been announced by Ralph L. Boyer, Vice President and Chief Engineer of The Cooper-Bessemer Corporation, Mount Vernon, Ohio. Melvin J. Helmich is now Supervisor, Railway Engineering; Edwin J. Fithian, Jr. is Project Engineer, Locomotive Engine Development.

A graduate Mechanical Engineer from Purdue University, Mr. Helmich joined Cooper-Bessemer immediately after leaving school to enter Cooper-Bessemer's Engineering Training Program. Assistant to Engineer, Railway Division, in 1951, he was later elevated to Engineer, Railway Division on applications of Cooper-Bessemer engines for locomotive and dragline service. A Professional Engineer, he holds membership in the American Society of Mechanical Engineers, and the Society of Automotive Engineers.

Mr. Fithian holds a degree in Mechanical Engineering from Purdue University from Purdue University. After a period of engineering training at Cooper-Bessemer he became associated with the Stationary Engineering Department as application engineer and served this capacity until his recent promotion to Project Engineer, Locomotive Engine Development.

Tip on Engine Parts

The engine parts of a diesel engine are carefully designed and engineered components, which together produce the desired power and efficiency of the diesel unit. Each working part must be considered vital to the overall engine and should therefore receive careful attention. The following is a handy check list for maintaining precision engine parts:

1. Never handle pistons or cylinders to allow distortion.
2. Periodically check piston and liners for wear.
3. Check for correct piston clearance.
4. Periodically check piston cooling system.
5. Check for worn or weak rings.
6. Allow sufficient ring side clearance and end clearance.
7. Be sure oil ring control is effective.
8. Keep crankcase breather-vent clean.
9. Maintain proper bearing clearance.
10. Never allow bearings to wear to the point of misalignment.
11. Keep intake and exhaust valves maintained and tight.
12. Guard against overheating of bearings.

Advertising Manager

Harnischfeger Corporation, Milwaukee, announces the appointment of Charles F. Parthum as advertising and sales promotion manager. Mr. Parthum was formerly with The Buchen Company of Chicago and before that with MacManus, John & Adams of Detroit and New York. He is a graduate of the University of Michigan and the University of Rochester.

Bulletin on V-Belts

V-Belts are the subject of a new bulletin recently issued by Worthington Corporation. The bulletin contains numerous illustrations of the many Worthington-Goodyear types of V-Belts available for drives employed in heavy industrial applications and miscellaneous light machinery drives. Featured are the Steel Cable Belts which have the highest horsepower rating of any standard section V-Belt. They are especially adaptable for drives requiring extra strength and heavy continuous service. High tensile airplane type steel cables, a revolutionary development in body construction, carry the load.

Also described are the HY-T Belts, a premium-rated synthetic fiber with the surplus stretch removed; the EC cord V-Belt designed for conventional drives; the open-end V-Belts for line-shaft drives, no-take-up drives and dismantle-to-install drives which will work on any V-Belt drive with normal hp ratings; the light-duty V-Belts for home appliances, small farm machines and other light machinery; and the Vee Ply Belts (quick detachable V-Belt) adaptable to most V-drive applications where continuous heavy-duty service is needed.

The bulletin contains a complete listing of the many multiple V-Belt sizes available. For copy, please write Worthington Corporation, Mechanical Power Transmission Sales Department, Oil City, Pa., specifying bulletin V-1400-B20-P.

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Record Sales

Shareholders of Diamond T Motor Car Company held their annual meeting recently in an atmosphere of increasing enthusiasm as President E. J. Bush reviewed the progress achieved in recent months. The company he said, had worked its way through the serious problems subsequent to the ending of military contracts in 1953 and was now well on its way to new heights of success in the commercial field. The abrupt reversal from a discouraging period of transition and losses is the product of a number of important developments in the company's products and methods. The new series of conventional heavy-duty trucks introduced in 1955 was favorably received and sales of this line built up rapidly as the new models demonstrated their excellence in operation. This gain was paralleled by strongly increased acceptance for diesel models and the Diamond T Tilt-Cab line, for which the advantages had gained wider recognition in the field.

As evidence of this continuing trend and the progress of the company in the heavy-duty field, Mr. Bush had available a detailed breakdown of the first quarter which set a new record in dollar volume of commercial truck deliveries. As compared to the same period of last year, the sales increase amounted to 49%, and a profit after taxes of $259,000 as against a loss of $55,000 after tax credits in the earlier period. Each successive month of the current year has registered a new increase in units, in dollar volume and in operating profit. Deliveries for April again showed an increase and backlogs of unfilled orders have risen to new levels.

A meeting of the new Board of Directors followed, at which major changes of officers and executive staff were voted and approved. Mr. Tilt, Chairman of the Board, reported that Mr. Bush had tendered his resignation as President, desiring to be relieved of the responsibilities of that office, which he had carried since 1946. His resignation was accepted, subject to his continuation as Treasurer, and by action of the Directors a new Office of Vice-Chairman of the Board was created to which he was also elected.

Z. C. R. Hansen was elevated to the Presidency, climaxing a three year progression during which he had been successively Vice-President and Director of Sales and Executive Vice-President. Hansen came to Diamond T in 1953 from Portland, Oregon, where he had been General Manager of the Diamond T dealership, Automotive Equipment Co. He had there achieved a unique record, having raised Diamond T sales in the area from an insignificant fraction to the Number One position among all Diamond T distributors and dealers throughout the country. He has been associated with the truck industry for more than twenty-five years. He received his early training with International Harvester Co. and its export subsidiary, where his activities included accounting and auditing as well as sales and sales supervision both in Europe and in the United States. He left them in 1944 to become Vice-President and General Manager of Automotive Equipment Co.

R. C. Wallace, previously Chief Engineer, was elected Vice-President in Charge of Engineering. J. F. Danielson, Secretary of the company and auditor for many years, resigned from further active duty as Secretary, although continuing in a consulting capacity, and was replaced by J. B. Wescott.

Preventive Maintenance Tool

A new, automatic instrument for diesel engine maintenance procedures is being manufactured by Applied Research

You will be among the first to receive a copy if you order now. The same price as in former years, $10.00 for a reference volume that grows more valuable as each year passes.

Laboratories, of Glendale, California, makers of spectrochemical analytical equipment. The instrument, called the Quantometer, is being used to check condition of diesel engines by thorough analysis of crankcase oil. The Quantometer, using only a half teaspoon of sample oil, provides a complete quantitative analysis in two minutes, recorded on a direct reading chart. Correlation of the analysis with known engine data then enables engineers to detect wear and other factors before there is a chance of engine damage. The instrument permits great savings in time over usual procedures and, since it detects elements to the millionth part, it provides immediate data not readily obtained by other methods, according to the manufacturer. A reading which deviates from a known standard is thus the earliest indication of incipient trouble.

The instrument has been in regular operational use in the laboratories of the Chicago and North Western Railways for three months. In that time, reports the railroad, much in maintenance costs has been saved through this program of preventive maintenance. According to Vic Barth, Assistant Engineer of Tests at C&NW, the Quantometer "locates engine trouble before it starts."

The C&NW instrument is set to obtain quantitative readings on 16 elements, and eliminates need for photographic procedures and densitometer measurements. Operating on the optical emission principle, the unit consists of three sections: Multisource unit, spectrometer and recording console. Full information is available from the manufacturer, Applied Research Laboratories, 3717 Park Place, Glendale, California.

DIESEL ENGINE CATALOG

Volume 21

YOUR COPY OF VOLUME 21, DIESEL ENGINE CATALOG

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3. TRANSMISSIONS. This section gives you the latest information on torque converters, fluid drives, and other modern means of transmitting power.

4. ACCESSORY EQUIPMENT. Recent developments in fuel injection systems, control devices, and other auxiliary units are covered in this section.

5. MARKET PLACE. You find here a convenient, time-saving listing of sources from which you can obtain the multitude of items and services needed by the growing diesel industry.

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LeTourneau Appointment

Appointment of Jack G. Errion to the position of assistant to the domestic sales manager was announced today by John W. Schoen, vice-president and general sales manager of LeTourneau Westinghouse Company. Errion, who has been serving as sales promotion manager for the firm, will direct the company's sales training program as well as assist W. E. Hendricks, domestic sales manager in domestic sales activities.

Sales Representative

Alco Products, Inc. announced recently the return from Naval service of Del Thoman and his assignment as sales representative in the San Francisco area. Thoman, a 1950 graduate of the U.S. Merchant Marine Academy, was a field representative for Alco in the Central and Southwestern regions before entering service two years ago. While in the Navy he served one year as an assistant industrial manager at Seattle, Washington, and a year as assistant resident supervisor of shipbuilding at Bellingham, Washington. He was released to inactive duty with the rank of lieutenant, junior grade.

As sales representative on the West Coast, Thoman will handle Alco's complete product line, consisting of diesel-electric locomotives, diesel engines for stationary and marine applications, locomotive renewal parts services, springs and forgings and a variety of products for the petroleum and petro-chemical industries.

Thoman first joined Alco in 1950 at Schenectady, N.Y. in the company's junior engineering training program. Upon completing that program in 1952, he was assigned as a field representative in the Southwestern region, with headquarters in Los Angeles. In October, 1953, he was transferred to the Chicago region. Thoman is 27 and a native of Salt Lake City.

Elected Assistant General Manager

Eugene L. Miller

E. L. Miller has been elected to the office of Assistant General Manager in The Cooper-Bessemer Corporation by action of the Board of Directors. Acting upon the recommendation of Cooper - Bessemer's President, Lawrence F. Williams, Mr. Miller's new capacity places him directly under the President and General Manager. In this capacity, Mr. Miller has responsibility for the over-all operations of the Company. A graduate of the Oklahoma A & M College as a mechanical engineer, Mr. Miller served four years with the Army Engineers. He joined the engineering department of The Cooper-Bessemer Corporation in 1946, and was appointed Assistant General Manager in 1954.

Flareless Tube Fittings

The Weatherhead Company, Fort Wayne Division, Fort Wayne, Indiana, has designed and is now in production on a new type 7000 Series Ermeto high-pressure SAE flareless, straight-thread hydraulic tube fitting. This new fitting is an adaptation of the Weatherhead Ermeto design used in military, construction and industrial equipment for hydraulic and pneumatic systems.

The new 7000 Series Ermeto line meets the new standards as set by the SAE and offers the following advantages: 1) —Designed to accommodate minimum close coupling, positive seal and ease of assembly. 2) —New phosphate finish (identified as "Weathercote") resistant to nonflammable hydraulic fluids as well as petroleum base fluids. Even without lubrication, "Weathercote" finish reduces torquing to preset or reset sleeve. 3) —Designed for use with the new SAE "O" ring boss, this new line withstands high operating pressures without the use of backup rings; results in less "O" ring distortion, long "O" ring life. The new type "O" ring seal is also designed for air application and tested to operate at temperatures from −65° to 212°F.

Specifically designed for high-pressure systems, the new Ermeto tube fitting is stocked in 31 different styles and in sizes from ⅛ in. to 2 in. Simplicity of design and ease of assembly simplify field replacement, thereby reducing downtime to a minimum. Weatherhead industrial distributors will serve as sales outlets for the new fittings. For further engineering data contact a Weatherhead distributor or write The Weatherhead Company, 128 West Washington Blvd., Fort Wayne, Indiana. ITS NEW

Informative Publication

Motoren-Werke Mannheim AG, who manufactures the well known MWM line of diesels has just started a new magazine, or house organ under the name of "MWM Nachrichten," and it is one of the best illustrated publications of its type we have seen in a long time. The details of design and construction of the MWM diesels is clearly brought out without the use of too many adjectives or superlatives. Copies of this very fine publication may be obtained by writing direct to Motoren-Werke Mannheim AG, Vorm. Benz Abt. Stat. Motorenbau, Mannheim, Carl-Benz-Strabe, Germany; Reference PT-Lin/Ga.

Bosch Appointments

Sidney E. Miller

Harold R. Sennstrom

Kenneth L. Leaman

Sidney E. Miller, vice president—engineering, American Bosch Division, American Bosch Arma Corporation, was named to fill the vacant post of vice president and general manager of the Springfield, Mass., Division, according to an announcement by Clifford A. Sharpe, vice president—operations, of the Corporation. Promotion of two other high divisional officers also was announced by Sharpe. Harold R. Sennstrom, vice president—product development, succeeds Miller as vice-president—engineering. Kenneth F. Leaman becomes assistant general manager as well as vice president—manufacturing.

Miller has been associated with American Bosch since 1944 as product engineer, manager of standards, master mechanic, assistant to vice president—manufacturing, manager of engineering laboratories, and manager of the engineering division. He was formerly associated with the Frigidaire Division of General Motors and General Electric. He is a graduate of the University of Michigan with a master's degree in electrical engineering.

Sennstrom came to American Bosch Division from Alco Products Inc., where he served for fourteen years in various engineering and sales capacities, including those of research engineer, executive engineer, chief applications engineer, and new product sales promotion manager. He is a graduate of Purdue University with degree of bachelor of sciences-mechanical engineering in 1937.

Leaman joined American Bosch early in 1954 as assistant to vice president—operations of American Bosch Arma Corporation and later that year was assigned to American Bosch Division. He was previously associated with Consolidated Vultee Aircraft Corporation for eleven years in various executive and manufacturing capacities in several of the corporation's plants throughout the country. He had previously been with United Aircraft Corporation in its manufacturing division.

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IH-Powered Bucyrus Erie

A 200 hp International Harvester diesel in a 2-yard Bucyrus Erie back-hoe is going to speed up their excavating work in and around Ann Arbor, Michigan, a great deal, according to Frank Siller, partner in Siller Construction Company. "We expect our jobs to be speeded up 60%," said Mr. Siller whose new shovel was recently delivered by Wolverine Tractor and Equipment Company, Michigan distributors for IH and Bucyrus-Erie.

Left to right: Frank Siller of Siller Construction Co., Herb Bradley, his shovel operator, and Clarence Nischke, Bucyrus-Erie erection engineer.

Working in nice, loose dirt at an excavation for a new City-County building parking garage, the IH-powered Bucyrus Erie was lifting nearly 3 yards each pass, swinging it out of a 20-ft. deep excavation and loading 5-yard trucks every two passes with dirt left over. Siller Construction Company is a young firm, having been in business only a little over two years. They already operate, besides this shovel, two 22-B Bucyrus-Erie shovels, two Northwest cranes and two International Harvester diesel tractors.

Diesel for Okinawa

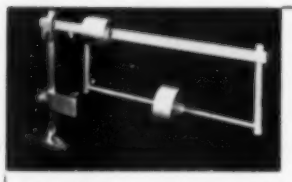
This new Model P6 Union diesel shown being loaded for shipment to Okinawa will be used for a heavy duty generating installation developing 300 kw at 450 rpm at the Ordnance Storage Area in Okinawa. It duplicates a unit installed at Guam for the Air Force. The engine has six cylinders with a 12 in. bore and 15 in. stroke.

Quick Connectors

The Hartford Machine Screw Company, Hartford, Connecticut, manufacturers of the Roosa Master diesel fuel injection pump, has developed a new quick-connector leak-off system. Two simple and inexpensive fittings at each nozzle, plus one end plug for the system, work wonders in producing a leak-off system that is fast, easy-to-install or disconnect, yet withstands return oil pressure.

This new system eliminates flaring, ferrules and brazing. The only tool required is a hacksaw (or tube cutter). The system is also claimed to eliminate leaks due to vibration as the line connectors act as miniature shock absorbers. In addition to low initial cost of the parts, savings are effected on labor costs, installation and time saved on engine shutdowns to change nozzles or repair broken or leaky lines. These quick-connectors also permit fast on-the-spot repairs or replacement by the operator at a single nozzle or complete system.

The three simple parts (illustrated) do the job. They consist of a leak-off connector and end plug made of a special composition impervious to fuels and a leak-off stud machined from aluminum. The parts are available to engine manufacturers for use on new equipment and will be available to diesel engine owners in packaged sets through distributors and service stations. Where not available locally, write direct to Roosa Master Fuel Injection Division, The Hartford Machine Screw Company, Hartford 2, Conn. for full information. ITS NEW



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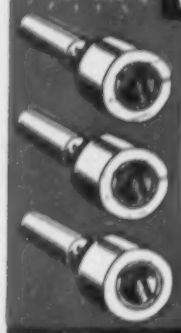

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(This is ad #10 in a series designed to tell Diesel Operators the important story about DaRoS Swedish Iron Piston Rings.)

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See what we mean? You can't depend on just *any* diesel for performance like this. Remember *wherever* you want top dependability and long-range power economy, big job *or* smaller job, Cooper-Bessemers are a natural!

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